

SONY®

HD TRINITRON® COLOR MONITOR

HDM-3830

HDM-3830E

HDVS

OPERATION AND MAINTENANCE MANUAL

1st Edition

Serial No. 2000001 and Higher (HDM-3830)

Serial No. 2000001 and Higher (HDM-3830E)

SONY®

HD TRINITRON® COLOR MONITOR

HDM-3830

HDM-3830E



HDVS

OPERATION AND MAINTENANCE MANUAL

1st Edition

Serial No. 2000001 and Higher (HDM-3830)

Serial No. 2000001 and Higher (HDM-3830E)

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Important—To insure that the complete system (including this peripheral) is capable of complying with the FCC requirements, it is recommended that the user make sure that the individual equipment of the complete system has a label with one of the following statements.


"This equipment has been tested with a Class A Computing Device and has been found to comply with Part 15 of FCC rules."

—or—

"This equipment complies with the requirements in Part 15 of FCC rules for a Class A Computing Device."

—or equivalent.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK  ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

CAUTION!!

DO NOT USE THE EXTERNAL DEGAUSSER TO DEMAGNETIZE THE SCREEN.
BE SURE TO USE THE DEGAUSS SWITCH ON THE FRONT PANEL.

CONFIDENTIAL

The material contained in this manual consists of information that is the property of Sony Corporation and is intended solely for use by the purchasers of the equipment described in this manual.

Sony Corporation expressly prohibits the duplication of any portion of this manual or the use thereof for any purpose other than the operation or maintenance of the equipment described in this manual without the express written permission of Sony Corporation.

CONFIDENTIEL

Le matériel contenu dans ce manuel consiste en informations qui sont la propriété de Sony Corporation et sont destinées exclusivement à l'usage des acquéreurs de l'équipement décrit dans ce manuel.


Sony Corporation interdit formellement la copie de quelque partie que ce soit de ce manuel ou son emploi pour tout autre but que des opérations ou entretiens de l'équipement à moins d'une permission écrite de Sony Corporation.

VERTRAULICH

Das in dieser Anleitung enthaltene Material besteht aus Informationen, die Eigentum der Sony Corporation sind, und ausschließlich zum Gebrauch durch den Käufer der in dieser Anleitung beschriebenen Ausrüstung bestimmt sind.

Die Sony Corporation untersagt ausdrücklich die Vervielfältigung jeglicher Teile dieser Anleitung oder den Gebrauch derselben für irgendeinen anderen Zweck als die Bedienung oder Wartung der in dieser Anleitung beschriebenen Ausrüstung ohne ausdrückliche schriftliche Erlaubnis der Sony Corporation.

ATTENTION AU COMPOSANT AYANT RAPPORT A LA SÉCURITÉ!!

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET UNE MARQUE  SUR LES DIAGRAMMES SCHEMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DES SUPPLÉMENTS PUBLIÉS PAR SONY. LES RÉGLAGES DU CIRCUIT QUI SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT SONT IDENTIFIÉS DANS CE MANUEL. SUIVRE LES PROCÉDURES QUAND LES COMPOSANTS CRITIQUES SONT REMPLACÉS OU LE FONCTIONNEMENT IMPROPRE EST SUSPECTÉ.

ATTENTION!!

NE PAS UTILISER DE DÉMAGNÉTISEUR EXTÉRIEUR POUR DÉMAGNÉTISER L'ÉCRAN.
UTILISER LA TOUCH DE DÉMAGNÉTISATION (DEGAUSS) SUR LE PANNEAU FRONTAL.

TABLE OF CONTENTS

1. OPERATION

1-1.	Overview	1-1
1-2.	Location and Function of Parts and Controls	1-4
1-2-1.	Front Panel	1-4
1-2-2.	Rear Panel	1-6
1-2-3.	Sub-Control Panel	1-8
1-3.	Connection and Preparation at Installation	1-20
1-3-1.	Selecting Voltage	1-20
1-3-2.	Connection Example	1-21
1-3-3.	Correcting Beam Landing	1-22
1-4.	Setting Switches According to the Input Signals	1-25
1-5.	Adjustment	1-26
1-5-1.	Selecting Adjustment Modes	1-26
1-5-2.	Adjusting Color Temperature	1-28
1-5-3.	Adjusting Convergence	1-34
1-5-4.	Resetting Adjustment Data	1-37
1-5-5.	Checking the Unit with the Internal Test Signal	1-39
1-6.	Specifications	1-41
1-7.	Attachment of the Supplied Accessories	1-42
1-7-1.	Attaching the Monitor Hood	1-44
1-7-2.	Attaching the Carrying Handles	1-45

2. EXTERENAL DIMENSIONAL DIAGRAM AND DISASSEMBLY

2-1.	External Dimensional Diagram	2-1
2-2.	Removal of the Cover	2-2
2-3.	Inspection method of the R Board	2-2
2-4.	Inspection method of the CA Board	2-3
2-5.	Removal of the GA Board	2-3
2-6.	Removal of the F Board	2-4
2-7.	Removal of the Switching Regulator (CR-15EN)	2-4
2-8.	Removal of the QC Board	2-5
2-9.	Inspection method of the E Board	2-5
2-10.	Inspection method of the U Board	2-6
2-11.	Removal of the Switching Regulator (SF-11)	2-6
2-12.	Removal of the Switching Regulator (TK-18)	2-7
2-13.	Removal of the Holder (Z)	2-7
2-14.	Inspection method of the DC Board	2-8
2-15.	Removal of the Holder	2-8
2-16.	Inspection method of the BG Board	2-9
2-17.	Removal of Flyback transformer and HV Block	2-9
2-18.	Installing and Removal method of High Voltage Cable	2-10
2-19.	Removal of the Bezel Assembly	2-10
2-20.	Removal of the Picture Tube	2-11
2-21.	Removal of the PC Board Cover (D) (Sub-control Panel)	2-11
2-22.	Removal of Boards D, JA and JB	2-12
2-23.	Removal of Boards N and W	2-12
2-24.	Removal of Control Panel Assembly	2-13

3. CIRCUIT DESCRIPTION

4. ADJUSTMENT

4-1.	Internal View Diagram	4-1
4-2.	Board Arrangement Diagram	4-2
4-3.	Quick Reference	4-3
4-4.	SUB Control Panel	4-4
4-5.	Set-Up Adjustment	4-5
4-6.	Safety Related Adjustment	4-15
4-7.	Circuit Adjustment	4-23

5. DIAGRAMS

5-1.	Block Diagram	5-1
5-2.	Frame Wiring Diagram	5-15
5-3.	Mounting and Schematic Diagrams	5-19
	BA Board	5-21
	BB Board	5-26
	BC Board	5-31
	BD Board	5-36
	BE Board	5-41
	BF Board	5-46
	BG Board	5-51
	BN Board	5-56
	CA and CB Boards	5-62
	D Board	5-68
	DA Board	5-74
	DB Board	5-79
	DC Board	5-84
	E, K, P and U Boards	5-90
	GA, F, JA, JB and Y Boards	5-96
	N Board	5-101
	QA, QB and QC Boards	5-105
	R and W Boards	5-110
	ZA Board	5-116
	ZC Board	5-121
	ZD Board	5-126
	ZE Board	5-131
	ZN Board	5-136
	XA Board	5-141
5-4.	Semiconductors	5-143

6. EXPLODED VIEWS

6-1.	Bezel	6-1
6-2.	Picture tube	6-2
6-3.	Drawer Block	6-3
6-4.	Bottom Chassis	6-4
6-5.	B Block	6-5
6-6.	Z Block	6-6

7. ELECTRICAL PARTS LIST

7.	ELECTRICAL PARTS LIST	7-1
----	-----------------------------	-----

SECTION 1 OPERATION

1-1. Overview

The HDM-3830/3830E is a 38-inch color video monitor for the high definition video systems which conform to the BTA/SMPTE standard.

Adaptable to a variety of input signal format

BTA/SMPTE standard

The monitor has a 16:9 aspect ratio and uses the tri-level bipolar sync, which conforms to the BTA/SMPTE standard, and can receive the BTA/SMPTE standard Y/P_B/P_R signal or GBR signal.

Other input signal formats

Besides the BTA/SMPTE standard signal, the monitor can receive the old HDVS format signal * and 525-line-non-interlaced signal (IDTV decoder output).

Two input connector groups

The monitor is supplied with two input channels, A and B. You can select either one with the INPUT selector.

High quality picture

Flat and square screen

The monitor employs the Super Fine Pitch Trinitron picture tube whose surface is almost flat (the radius of the curvature is 2,000 mm.) and which has a squarely cornered screen, which provides a clear picture on the entire screen.

High picture resolution

The Super Fine Pitch Trinitron picture tube, which has a 0.46 mm phosphor trio pitch, realizes more than 1,000 TV lines of horizontal resolution.

High contrast with less reflected light

Gray panel and AR (anti-reflection) coating employed for the tube absorbs most ambient light and gives a sufficient picture contrast.

* RGB signal with 5:3 aspect ratio

Multiple adjustment functions

Sub-control panel in the drawer

Controls are located on the sub-control panel in the drawer and you can use them easily by pulling out the drawer. On the sub-control panel, there are aperture control, input mode selectors, contrast and brightness preset controls, convergence control, color temperature control, and other controls to adjust the picture.

Seven types of test signals

The built-in test signal generator generates seven test signals: crosshatch, inverted double hatch, flat field, set up, gray scale, dot and PLUGE* signals, to be used for checking the monitor.

Convergence adjustment

The digital convergence adjustment circuitry makes fine and easy convergence adjustment possible all over the screen.

High performance adjustment circuitry

Beam landing adjustment

You can easily make adjustment with the beam landing adjustment circuitry if beam landing is affected by horizontal terrestrial magnetism when you install the monitor.

Aperture compensation

The aperture adjustment circuitry can only adjust the Y signal both in the Y/P_B/P_R signal or in the GBR signal.

Stable color temperature

Both the beam detector and the pulse adder control the black level, brightness and contrast to keep the color temperature constant for a long time.

Digital uniformity adjustment

The digital uniformity adjustment circuit improves the white uniformity all over the screen.

Excellent focus characteristics

The electrostatic convergence adjustment circuit, dynamic magnetic quadropole, and horizontal and vertical dynamic focus circuit provide an optimum focus all over the screen.

* PLUGE=Picture Line Up Generating Equipment

Others

Internal or external sync signal which is selectable

You can use the internal sync signal or the external sync signal fed to the EXT SYNC connector by selecting either one with the SYNC selector. If horizontal and vertical sync signals are fed to the HD and VD connectors respectively, these signals will be selected.

Sync signal display

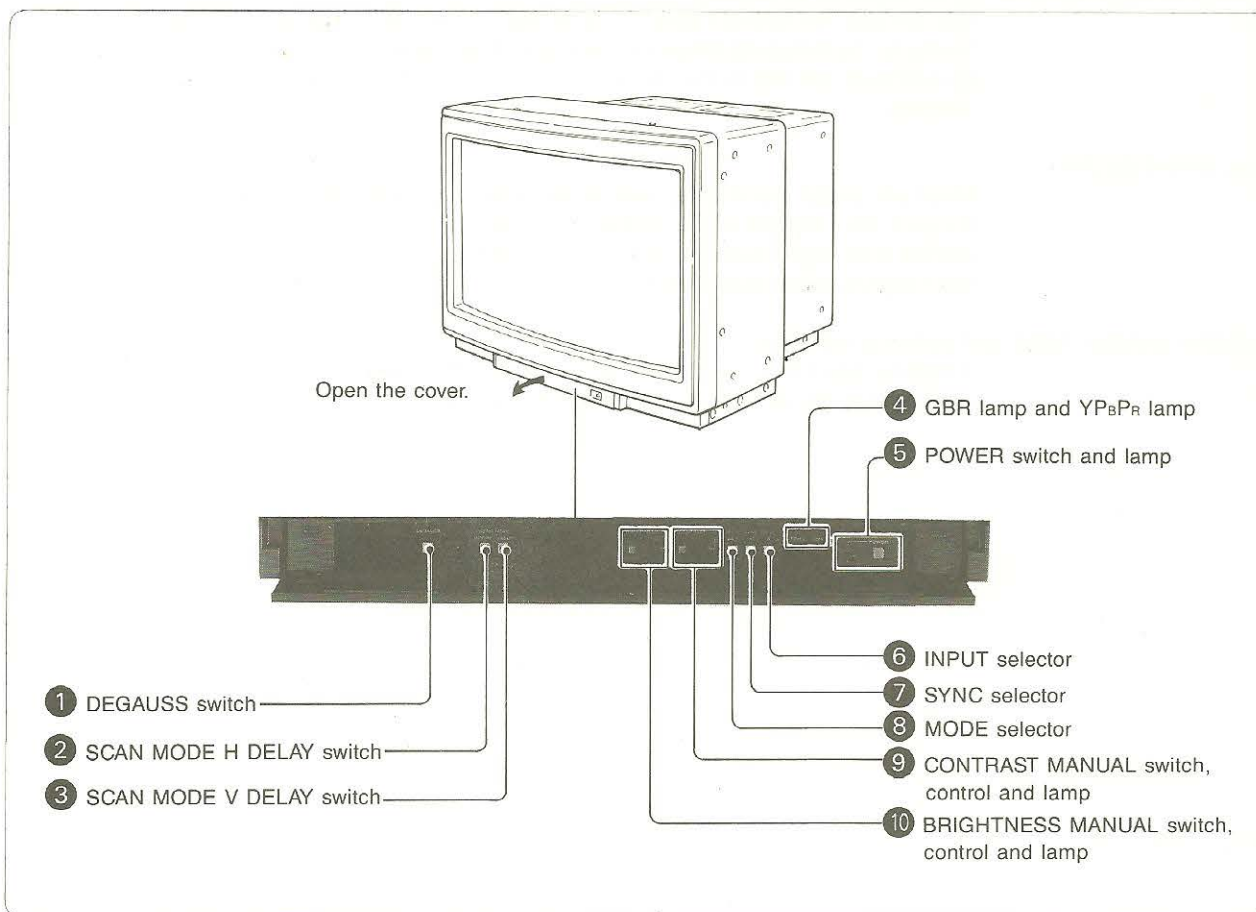
When you press the H delay switch, the horizontal sync signal appears at the 1/4 the distance from the left of the screen and when you press the V delay switch, the vertical sync signal appears at the center position. To monitor both signals as pulse-cross signal, press both buttons.

Supplied monitor hood and carrying handles

A monitor hood can be attached to eliminate light reflection on the screen. When the monitor is to be carried, carrying handles can be attached.

1-2. Location and Function of Parts and Controls

1-2-1. Front Panel



1 DEGAUSS switch

Press this switch with the unit on to demagnetize the picture tube. This switch does not operate when pressed again right after it has been pressed once. Wait for more than five minutes to use the switch again.

2 SCAN MODE H DELAY switch

Press this switch to monitor the horizontal sync signal. The picture moves right and the sync signal appears at the 1/4 the distance from the left of the screen. At this time, the brightness (luminance) of the picture increases. Press the switch again to place the picture in the normal position.

3 SCAN MODE V DELAY switch

Press this switch to monitor the vertical sync signal. The picture moves down and the sync signal appears at the center of the screen. At this time, the brightness (luminance) of the picture increases. Press the switch again to place the picture in the normal position.

- When you press both the SCAN MODE V DELAY and SCAN MODE H DELAY switches, both horizontal and vertical syncs can be monitored as a pulse-cross picture.

4 GBR lamp and YPbPr lamp

Either of the lamps lights to indicate the mode of the input signal fed to the INPUT A connectors (when A is selected with the INPUT selector **6**) or fed to the INPUT B connectors (when B is selected). The mode of the input signal is selected with the INPUT A or INPUT B mode selector on the JA board.

5 POWER switch and lamp

Press to turn on the unit. When power is turned on, the lamp lights and the automatic degaussing circuit is activated to demagnetize the picture tube. The picture will not be stable for about 5 seconds until demagnetization is completed.

6 INPUT selector

- ☐ **A:** To monitor the signals fed to the INPUT A connectors.
- ☐ **B:** To monitor the signals fed to the INPUT B connectors.

7 SYNC selector

- ☐ **INT:** To use the composite sync signal contained in the G signal of the GBR signal or in the Y signal of the Y/Pb/Pr signal.
 - ☐ **EXT:** To use an external sync signal fed to the EXT SYNC connector.
- The HD and VD signals, if they are supplied to the HD and VD connectors, have priority over the other two sync signals regardless of the switch setting.

8 MODE selector

- ☐ **COLOR:** To use the unit in the color mode. Normally select this setting.
- ☐ **B&W:** To set the unit in the black and white mode.

9 CONTRAST MANUAL switch, control and lamp

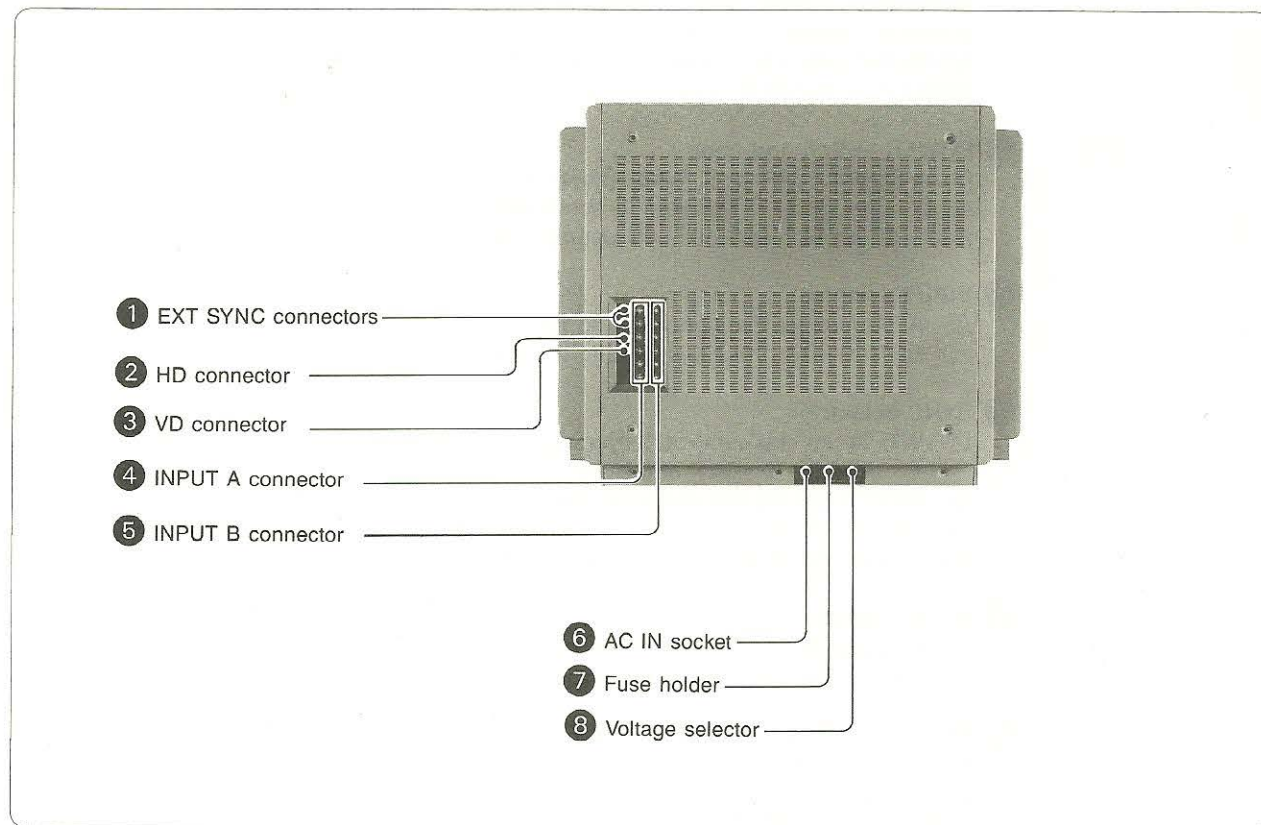
Press the switch (the lamp lights) and turn the control to adjust the contrast of the picture. When the lamp is not lit, the contrast level is set to the preset value which has been set by the PRESET CONTRAST control on the JA board.

10 BRIGHTNESS MANUAL switch, control and lamp

Press the switch (the lamp lights) and turn the control to adjust the brightness of the picture. When the lamp is not lit, the brightness level is set to the preset value which has been set by the PRESET BRIGHT control on the JA board.

☐ indicates that the switch is not depressed and
☒ indicates that it is depressed.

1-2-2. Rear Panel



① EXT (external) SYNC connectors

A sync signal (composite) is input. One of the two connectors is used for a bridging connection. If you do not use it, attach the supplied 75-ohm terminator.

② HD (horizontal drive) connector (BNC)

A horizontal sync signal is input. (The input signal is terminated at 75-ohms inside.)

③ VD (vertical drive) connector (BNC)

A vertical sync signal is input. (The input signal is terminated at 75-ohms inside.)

4 INPUT A connectors (BNC)

5 INPUT B connectors (BNC)

HDVS signals or 525-line-non-interlaced signals are input to each group. Set the switches on the JA board according to the format of the input signals. (Refer to "1-4. Setting Switches according to the Input Signals".) To select which input signals, A or B, to monitor, press the INPUT select button on the front panel.

Each group of connectors have connectors for a bridging connection. If you do not use them, attach the supplied 75-ohm terminator.

6 AC IN socket

Connect the supplied AC power cord.

7 Fuse holder

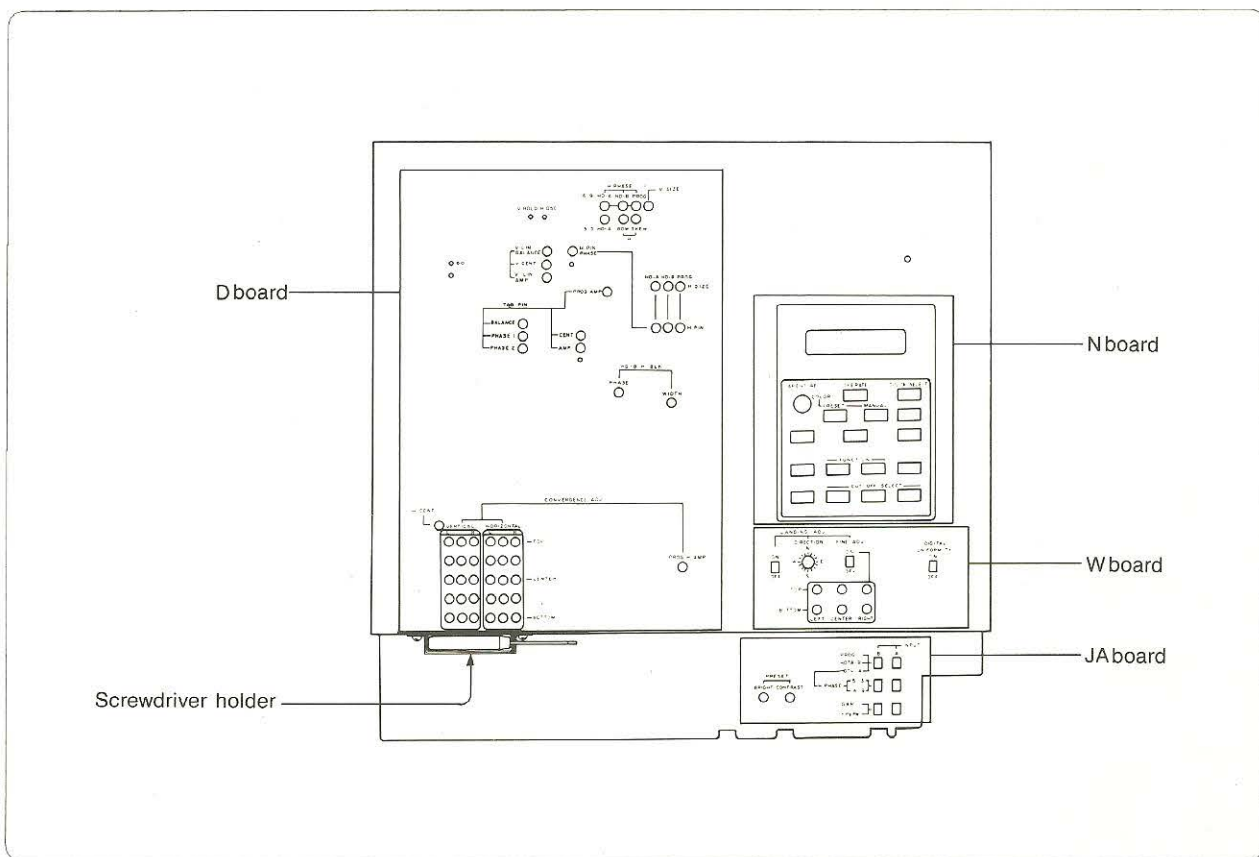
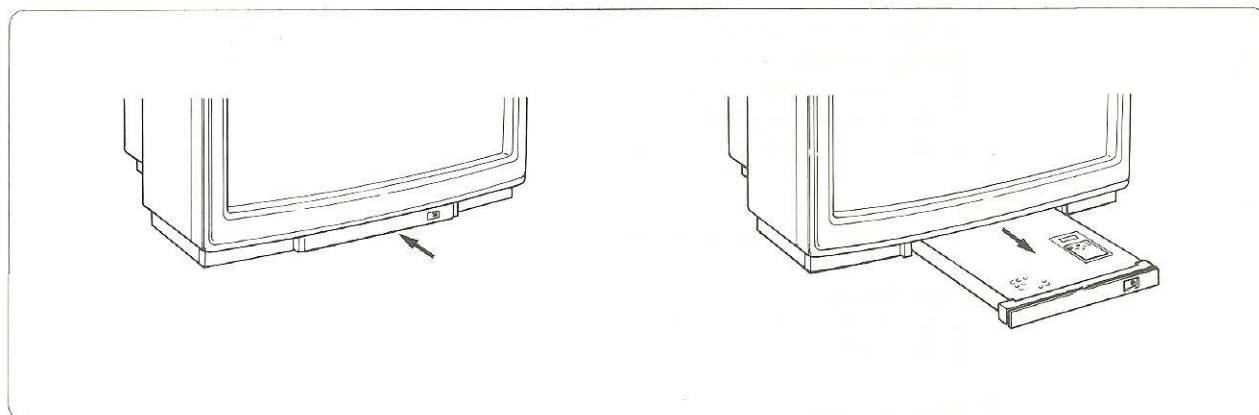
Use a 6.3A fuse for operation on 100—120V AC, or a T4A fuse for operation on 220—240V AC.

8 Voltage selector

Set to the local power line voltage, 100—120V AC or 220—240V AC.

1-2-3. Sub-Control Panel

Press the front panel and the drawer will come out.



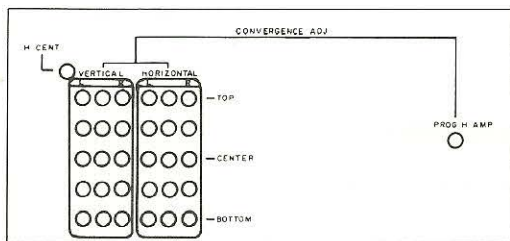
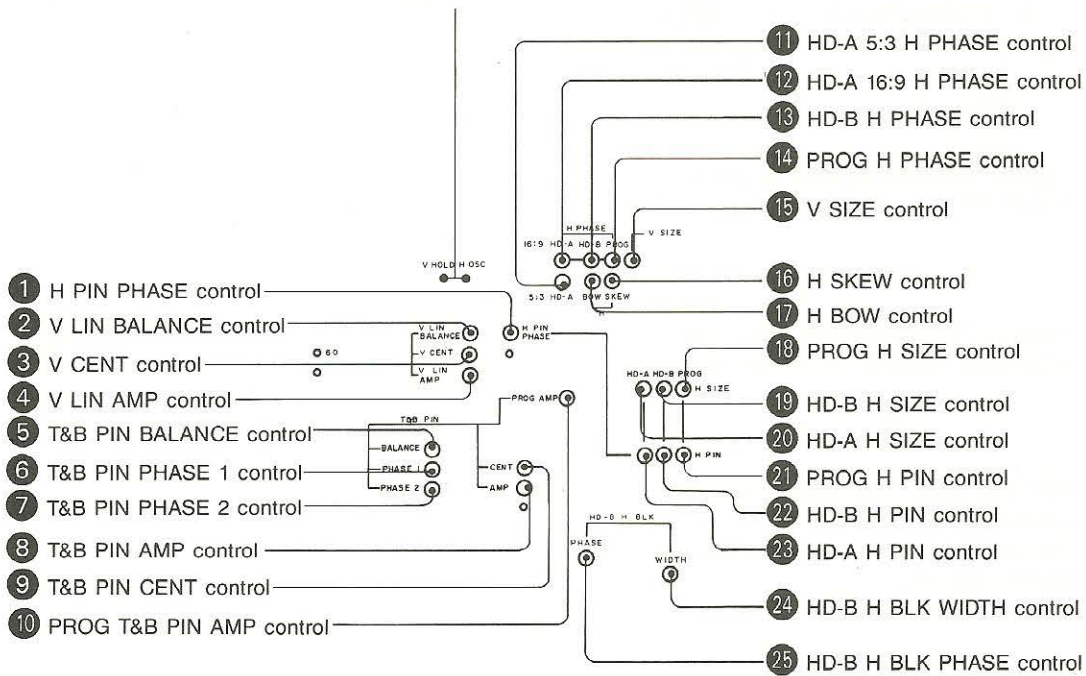
Note

To adjust the unit with the controls on the sub-control panel, wait for more than 30 minutes after the power has been turned on to fully warm up the unit.

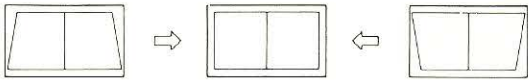

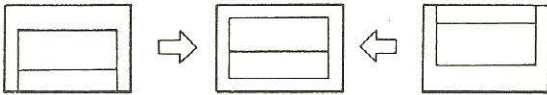

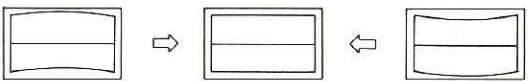
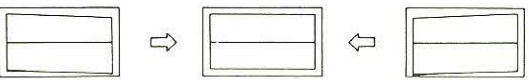
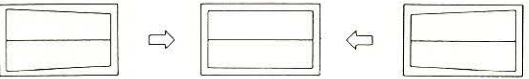
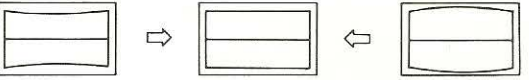
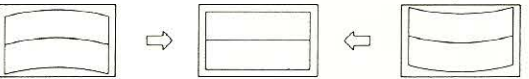
To adjust the controls, use the supplied screwdriver stored in the screwdriver holder on the panel.

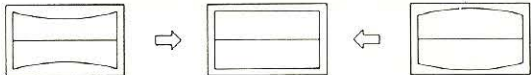
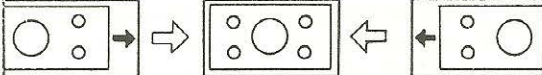
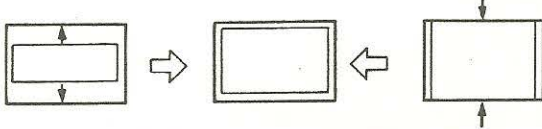
D board (Geometry distortion correction)

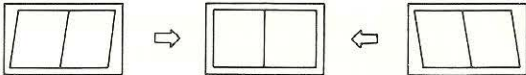
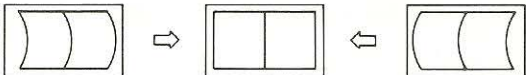

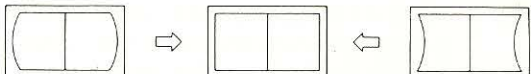
To adjust these controls, refer to the section on electrical adjustment in Section 4.





To adjust these controls, refer to the section on convergence adjustment in Section 4.

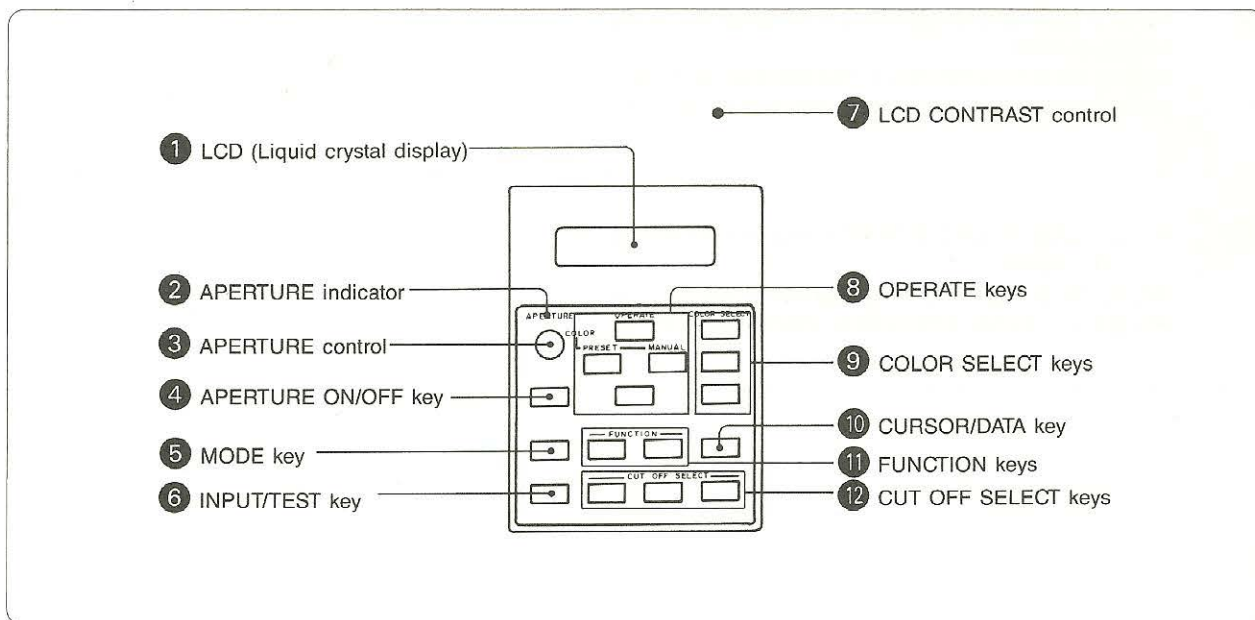
1	H PIN PHASE (horizontal pincushion) control Adjusts the phase of the pincushion distortion at the sides.	
2	V LIN (vertical linearity) BALANCE control Adjusts the vertical linearity balance of the picture.	
3	V CENT (vertical centering) control Adjusts the vertical position of the picture.	
4	V LIN AMP (vertical linearity) control Adjusts the vertical linearity of the picture.	
5	T&B PIN (top & bottom pincushion) BALANCE control Adjusts the phase of the pincushion distortion at the top and bottom.	
6	T&B PIN (top & bottom pincushion) PHASE 1 control Adjusts the phase of the pincushion distortion at the top and bottom.	
7	T&B PIN (top & bottom pincushion) PHASE 2 control Adjusts the phase of the pincushion distortion at the top and bottom.	
8	T&B PIN AMP (top & bottom pincushion) control Adjusts the amplitude of the pincushion distortion at the top and bottom.	
9	T&B PIN CENT (top & bottom pincushion centering) control Adjusts the pincushion distortion at the center of the screen.	

10	<p>PROG T&B AMP (progressive scanning line top & bottom pincushion) control</p> <p>Adjusts the pincushion distortion at the top and bottom when you set the INPUT A/B system selector on the JA board to PROG. Adjust this control after adjusting the T&B PIN AMP control 8.</p>	
11	<p>HD-A 5:3 H PHASE (HDTV-A old format horizontal phase) control</p> <p>Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to HDTV-A and the INPUT A/B H PHASE selector to 5:3 on the JA board.</p> <p>Note</p> <p>This control does not operate when you are monitoring the internal test signal with the INPUT A/B system selector set to HDTV-A. In this case, the format of the internal test signal is the new HDVS format and the phase can be adjusted with the HD-A 16:9 H PHASE control regardless of the INPUT A/B H PHASE selector setting.</p>	
12	<p>HD-A 16:9 H PHASE (HDTV-A new format horizontal phase) control</p> <p>Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector on the JA board to HDTV-A and the INPUT A/B H PHASE selector to 16:9 on the JA board.</p>	
13	<p>HD-B H PHASE (HDTV-B horizontal phase) control</p> <p>Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to HDTV-B.</p>	
14	<p>PROG H PHASE (progressive scanning line horizontal phase) control</p> <p>Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to PROG.</p>	
15	<p>V SIZE (vertical size) control</p> <p>Adjusts the vertical size of the picture.</p>	

16	H SKEW (horizontal skew) control Adjusts the skew of the picture.	
17	H BOW (horizontal bow) control Adjusts the bow of the picture.	
18	PROG H SIZE (progressive scanning line horizontal size) control Adjusts the width of the picture when you set the INPUT A/B system selector to PROG.	
19	HD-B H SIZE (HDTV-B horizontal size) control Adjusts the width of the picture when you set the INPUT A/B system selector to HDTV-B.	
20	HD-A H SIZE (HDTV-A horizontal size) control Adjusts the width of the picture when you set the INPUT A/B system selector to HDTV-A.	
21	PROG H PIN (progressive scanning line horizontal pincushion) control Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to PROG.	
22	HD-B H PIN (HDTV-B horizontal pincushion) control Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-B.	
23	HD-A H PIN (HDTV-A horizontal pincushion) control Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-A.	

<p>24</p>	<p>HD-B H BLK WIDTH (HDTV-B horizontal blanking width) control Adjusts the width of the horizontal blanking part when you set the INPUT A/B system selector to HDTV-B.</p>	
<p>25</p>	<p>HD-B H BLK PHASE (HDTV-B horizontal blanking phase) control Adjusts the phase of the horizontal blanking part when you set the INPUT A/B system selector to HDTV-B.</p>	

N board (color temperature and convergence adjustment and internal test signal monitoring)



1 LCD

The display shows the adjustment mode, data and messages to guide the operation.

2 APERTURE indicator

The indicator lights up when the APERTURE ON/OFF key 4 is set to ON and the APERTURE control 3 is activated for aperture compensation.

3 APERTURE control

Turn the control for aperture compensation (detail). Set the APERTURE ON/OFF key 4 to ON to activate the control.

4 APERTURE ON/OFF key

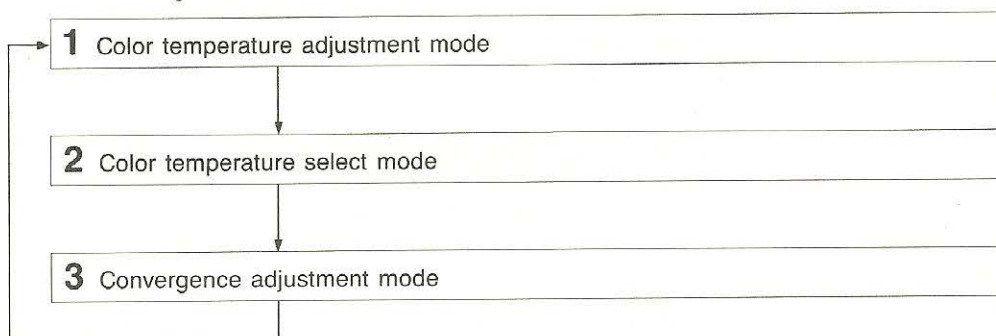
Set the key to ON and use the APERTURE control 3 for the aperture compensation. When the key is set to OFF, the control does not function and the frequency response for the video amplifiers is flat.

Lamps of the LCD and keys

The LCD and the keys are not lit when you do not operate any key. When you press a key, the display and some keys light to indicate that they are operative at that time. The lamps will go out in five minutes if no other keys are pressed.

5 MODE key

Press this key to change the adjustment modes. Every time the key is pressed, the mode changes as follows.

**6 INPUT/TEST key**

Press the key to select which signal, the internal test signal or the input signal, to monitor.

Note

If you monitor the input signal whose sync signal has a phase different from that of the internal test signal, the phase of the picture may shift. In this case, adjust the phase of the input signal with the H PHASE control (11 to 14 on the D board).

7 LCD CONTRAST control

Turn the control to adjust the contrast of the LCD.

8 OPERATE keys

These keys function differently depending on the adjustment mode. Press these keys to adjust the color temperature or convergence in each mode. In the color temperature select mode, press the COLOR PRESET () key or the COLOR MANUAL key () to select the preset color temperature or the colortemperature which you have adjusted.

9 COLOR SELECT keys

Press one of these keys to select the color for color temperature adjustment. The selected color is indicated as "G", "B" or "R" on the LCD.

10 CURSOR/DATA key

Use this key to adjust the convergence.

For coarse adjustment: Every time the key is pressed, the cursor moves to the next adjustment point on the monitor screen. The convergence at the point where the cursor is located can be adjusted with the OPERATE keys.

For fine adjustment: Pressing this key stops the cursor blinking and enables adjustment at the point where the cursor is located. Pressing this key again starts cursor blinking again and enables to move the cursor to a desired position with the OPERATE keys.

11 FUNCTION keys

Press the appropriate key to change the functions in the color temperature adjustment mode and the convergence adjustment mode, and press the appropriate key to change the test signal being displayed in the test mode.

Pressing the FORWARD key changes the function or the test signal in the following order.

Mode	Function or test signal
Color temperature adjustment	Bias 1 Gain Bias 2
Convergence adjustment	Coarse adjustment Fine adjustment
Test mode	Flat field Setup Gray scale Crosshatch Inverted double-hatch Dot PLUGE *

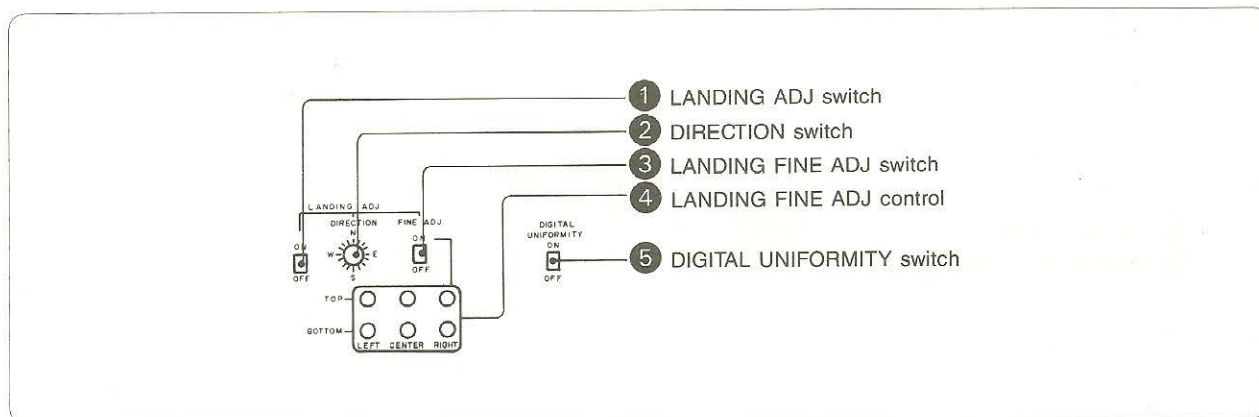
Pressing the BACK key returns the function or the test signal to the previously selected one.

12 CUT OFF SELECT keys

Press GREEN, BLUE or RED key to cut the beam of the corresponding color. To monitor single colors for beam landing adjustment, cut the two other unnecessary colors off by pressing their keys.

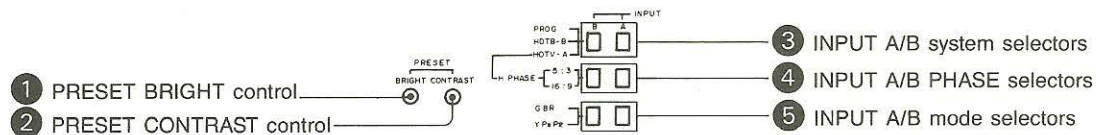
* PLUGE=Picture Line Up Generating Equipment

W board (beam landing and digital uniformity adjustment circuits)



- 1 LANDING ADJ (adjustment) switch**
Set the switch to ON to activate the beam landing (purity) correction circuit and adjust the beam landing with the DIRECTION switch ②. Keep the switch to ON after adjustment is over.
- 2 DIRECTION switch**
Turn the switch to correct the beam landing if there is impurity caused by horizontal terrestrial magnetism on the screen. To use this switch, set the LANDING ADJ switch to ON.
- 3 LANDING FINE ADJ (adjustment) switch**
Set the switch to ON for fine adjustment of the beam landing with the LANDING FINE ADJ control ④ when impurity still remains after adjustment with the switch ②.
- 4 LANDING FINE ADJ (adjustment) controls**
Turn these controls for fine adjustment of the beam landing. Use the appropriate control which corresponds to the portion on the screen to be adjusted.
- 5 DIGITAL UNIFORMITY switch**
Set the switch to ON to activate the digital uniformity correction circuit. Set the switch to OFF to monitor without correcting the uniformity.

JA board (brightness and contrast adjustment and input mode selection)



① PRESET BRIGHT (brightness) control

Turn the control to preset the picture brightness. The level is set to the preset level when you set the BRIGHTNESS MANUAL switch on the front panel to OFF.

② PRESET CONTRAST control

Turn the control to preset the picture contrast. The level is set to the preset level when you set the CONTRAST MANUAL switch on the front panel to OFF.

③ INPUT A/B system selectors

Set each switch to the appropriate position depending on the system of the input signals fed to the INPUT A or B connector. When you change the setting of the switch, it may take a short time for the unit to change the picture size, phase, color temperature and convergence data.

HDTV-A: For the HDTV format input signal. If this position is selected, set the INPUT A/B H PHASE selector ④ to the position (5:3 or 16:9) which is appropriate.

HDTV-B: For the BTA/SMPTE (new) HDTV format.

PROG (progressive scanning line): For the 525-line-non-interlaced signal (525 lines, 59.94 fields, non-interlace). The aspect ratio is 4:3.

4 INPUT A/B H PHASE selectors

Set the switch to the appropriate position depending on the format of the input signal when the INPUT A/B system selector **3** is set to HDTV-A.

16:9: For the BTA/SMPTE (new) HDTV format

5:3: For the old HDTV format

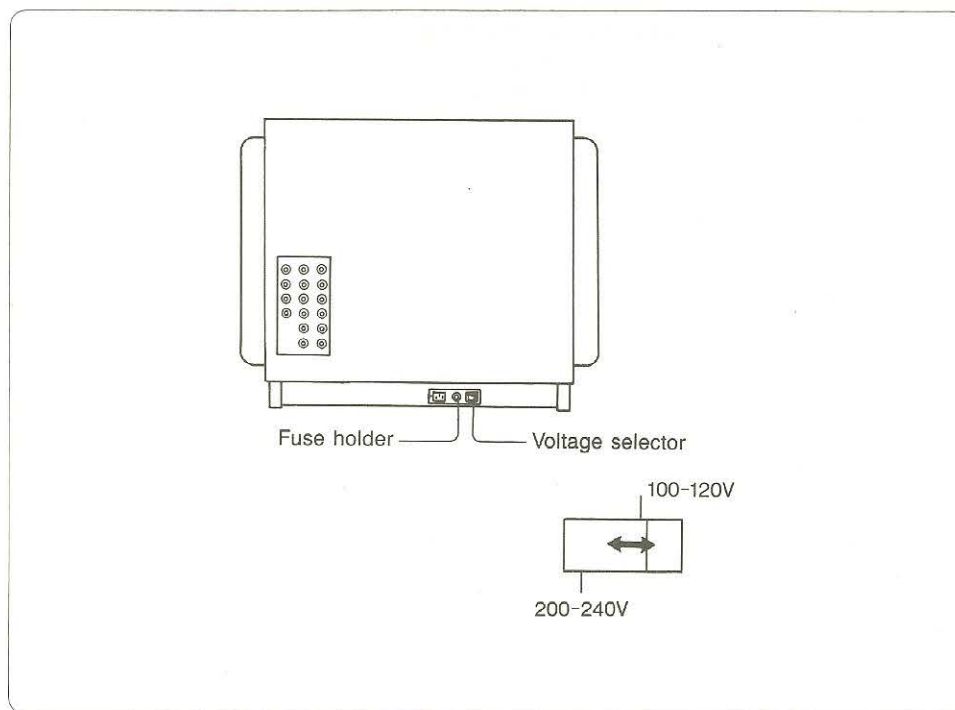
5 INPUT A/B mode selectors

Set each switch to an appropriate position, GBR or Y/P_B/P_R, depending on the mode of the input signals fed to the INPUT A or B connector. This switch is operative only when you set the INPUT A/B system selector **3** to HDTV-A or HDTV-B. When the switch is set to PROG, the GBR mode is selected regardless of the setting of this switch. The selected mode is indicated with the GBR or YP_BP_R lamp on the front panel.

1-3. Connection and Preparation for Installation

1-3-1. Selecting the Operating Voltage

The HDM-3830/3830E can operate on either 100—120 or 220—240V AC by selecting the operating voltage with the voltage selector. Before plugging in the unit, make sure that the voltage selector is set to the local power line voltage. Change the setting of the voltage selector, if necessary, as follows.



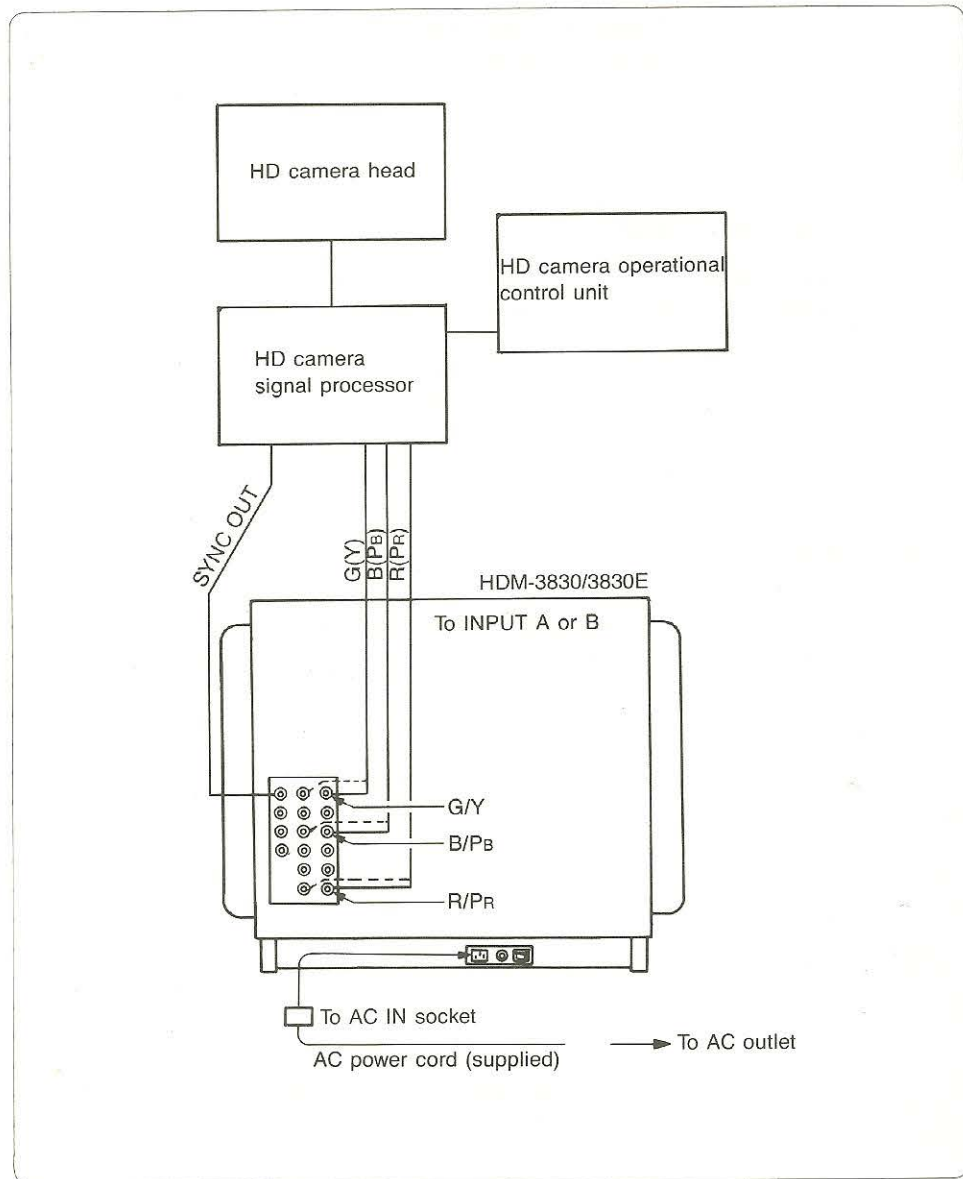
Changing the fuse

The fuse initially installed is as follows:

- 6.3A/125V fuse for 100—120V AC
- T4A/250V fuse for 220—250V AC

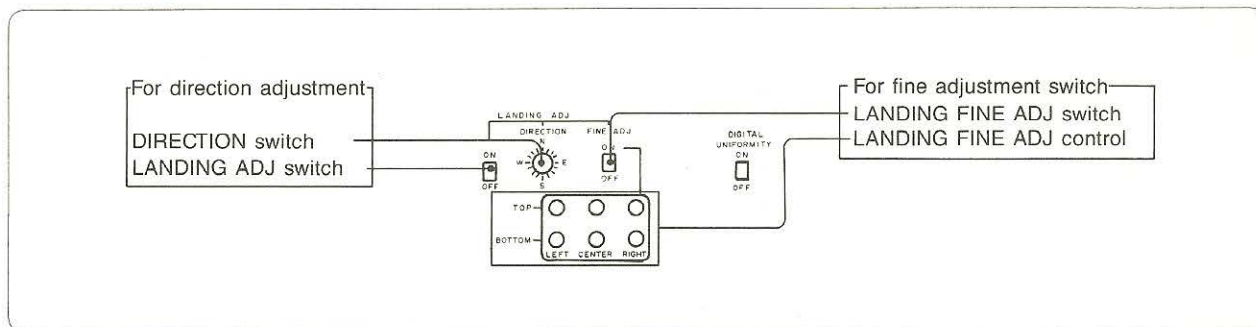
If you change the setting of the voltage selector, be sure to replace the fuse with the appropriate one.

1-3-2. Connection Example

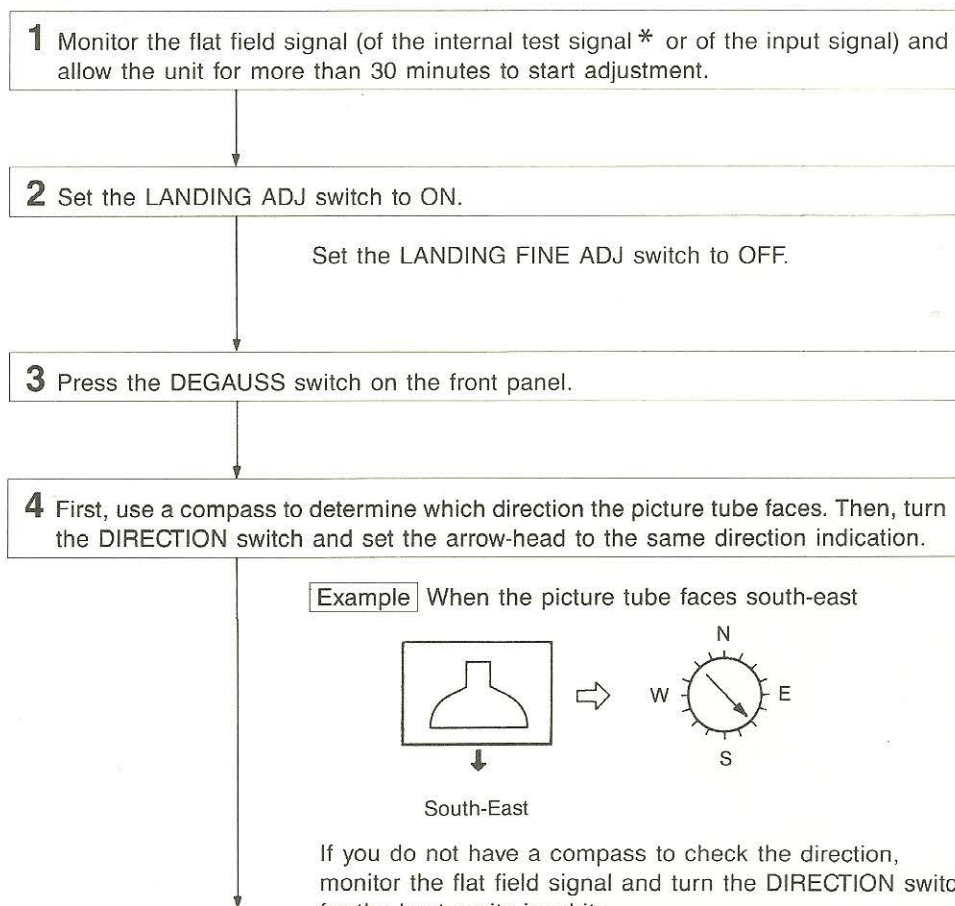


1-3-3. Correcting Beam Landing

Correct the beam landing (purity) with the controls on the W board if there is mislanding caused by terrestrial magnetism. For correction, do the direction (coarse) adjustment first, and if color impurity still remains, go on to the fine adjustment.



Direction adjustment



* To monitor an internal test signal

Press the INPUT/TEST key in the color temperature select mode. For details, refer to "1-5-5. Checking the Unit with Internal Test Signals".

5 Press the DEGAUSS switch * * again.

6 Check the purity in green, blue and red one after another by cutting the other two colors off with the CUT OFF SELECT keys.

If color impurity still remains, go on to the fine adjustment.

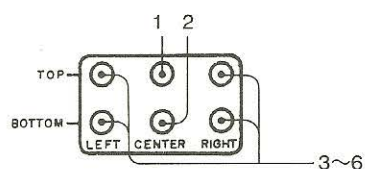
Fine adjustment

1 Set the LANDING FINE ADJ switch to ON.

2 Cut off the red and blue beams with the CUT OFF SELECT keys and monitor the screen only in green.

3 Turn the LANDING FINE ADJ controls to make green as bright as possible in each portion of the screen.

The indications of the controls correspond to the portion of the screen. Use the controls in the following order.



* * Wait for more than 5 minutes before pressing the DEGAUSS switch again. The switch does not function after while once it has been pressed.

↓

4 Press the DEGAUSS switch * *

↓

5 Check the purity in red and blue one after another by cutting the other two colors off with the CUT OFF SELECT keys. If impurity remains, repeat steps 2 to 5 to correct the beam landing.

Note

If color impurity still remains after the fine adjustment, the unit requires internal adjustment. Contact qualified Sony dealer.

* * Wait for more than 5 minutes before pressing the DEGAUSS switch again. The switch does not function after while once it has been pressed.

1-4. Setting Switches according to the Input Signals

You can monitor the input signals fed to either the INPUT A connectors or the INPUT B connectors. Select which one to monitor with the INPUT selector on the front panel. According to the format of the input signals, set the switches on the JA board as follows.

Switch settings for input signal A

Signal format	Front panel	JA board		
	INPUT selector	INPUT A system selector	INPUT A H PHASE selector	INPUT A mode selector
BTA/SMPTE standard HDTV-A signal (GBR)	A	HDTV-A	16:9	GBR
BTA/SMPTE standard HDTV signal (Y/P _B /P _R)				Y/P _B /P _R
Old format HDTV signal (GBR)			5:3	
BTA/SMPTE standard HDTV signal (GBR)		HDTV-B		GBR
BTA/SMPTE standard HDTV signal (Y/P _B /P _R)				Y/P _B /P _R
525 lines non-interlace signal (GBR)		PROG		

Do the same for input signal B using the switches for input signal B.

1-5. Adjustment

1-5-1. Selecting Adjustment Modes

Select the appropriate adjustment mode.

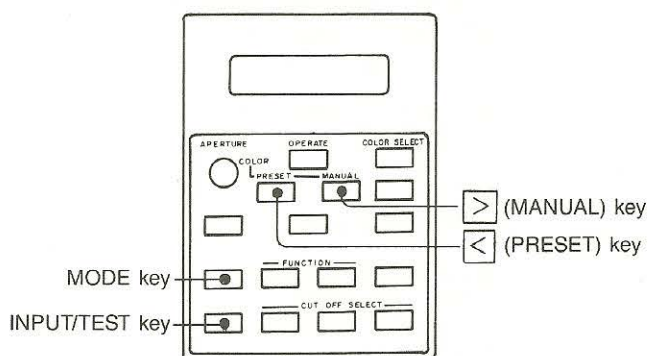
Color temperature select mode: To select the preset color temperature or color temperature which you have adjusted

Color temperature adjustment mode: To adjust the color temperature

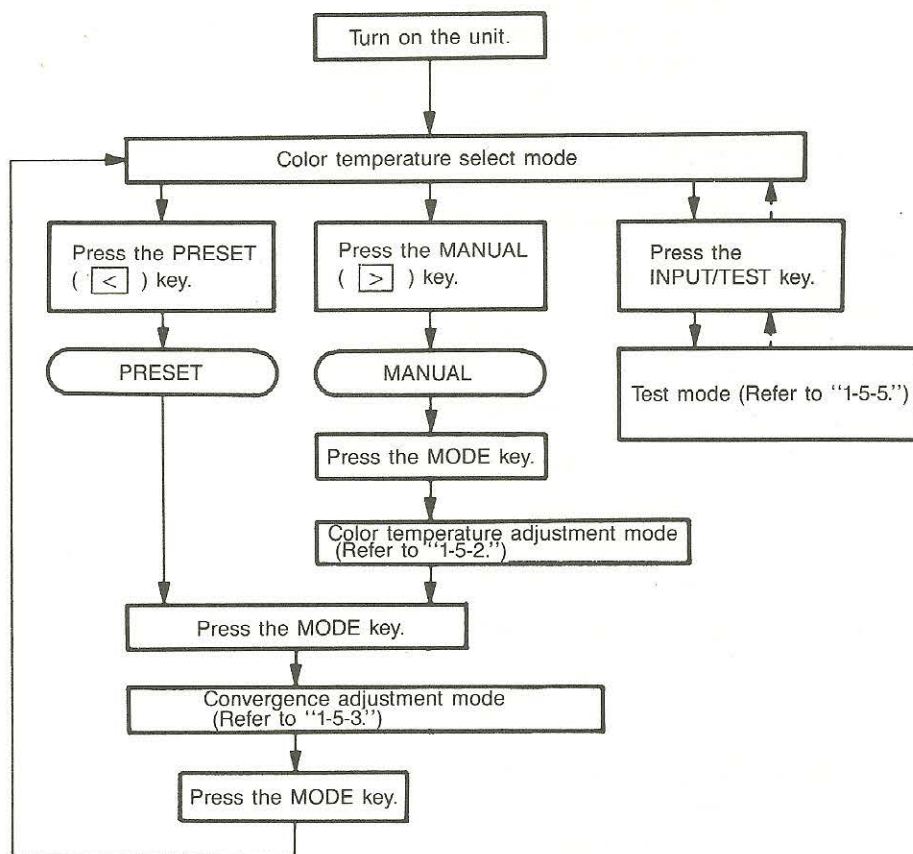
Convergence adjustment mode: To adjust the convergence

Internal test signal generating mode: To monitor internal test signals to check the unit's condition

When you turn on the unit, the unit is set in the color temperature select mode. Mode selection is performed by the N board of the sub-control panel.



To change the mode



Storing and recalling the adjusted data

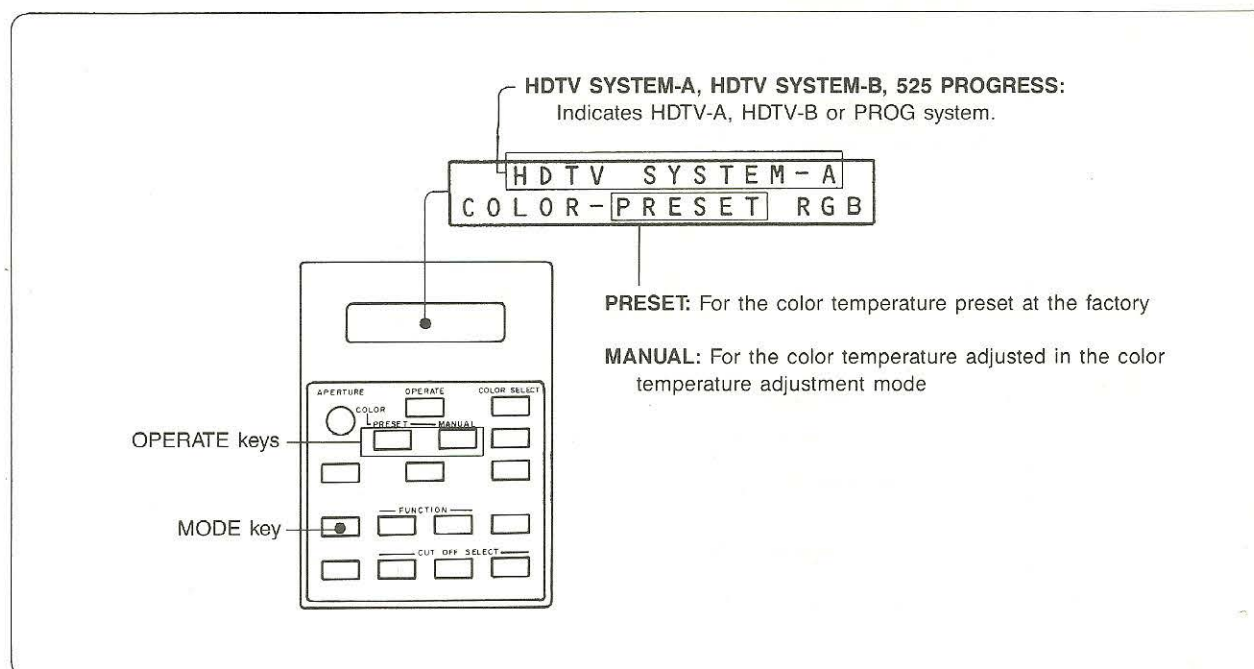
- Press the MODE key after adjusting the data in a mode. The adjusted data is stored in the memory.
- Memories are backed up by batteries and they hold the data after the power is turned off.
- The unit has memories for the color temperature and convergence which you have adjusted for each system separately, as well as a memory for the preset color temperature common to all the systems.
- It may take a little time to recall the data from the memories of a system when you change the setting of the INPUT A or B system selector on the JA board.

1-5-2. Adjusting Color Temperature

When the unit is turned on, the unit is set in the color temperature select mode. To use the preset color temperature, select PRESET in this mode. To use the color temperature which you have adjusted, select MANUAL. If necessary, adjust the color temperature in the color temperature adjustment mode.

Color temperature select mode

Press the appropriate OPERATE key to select PRESET or MANUAL.

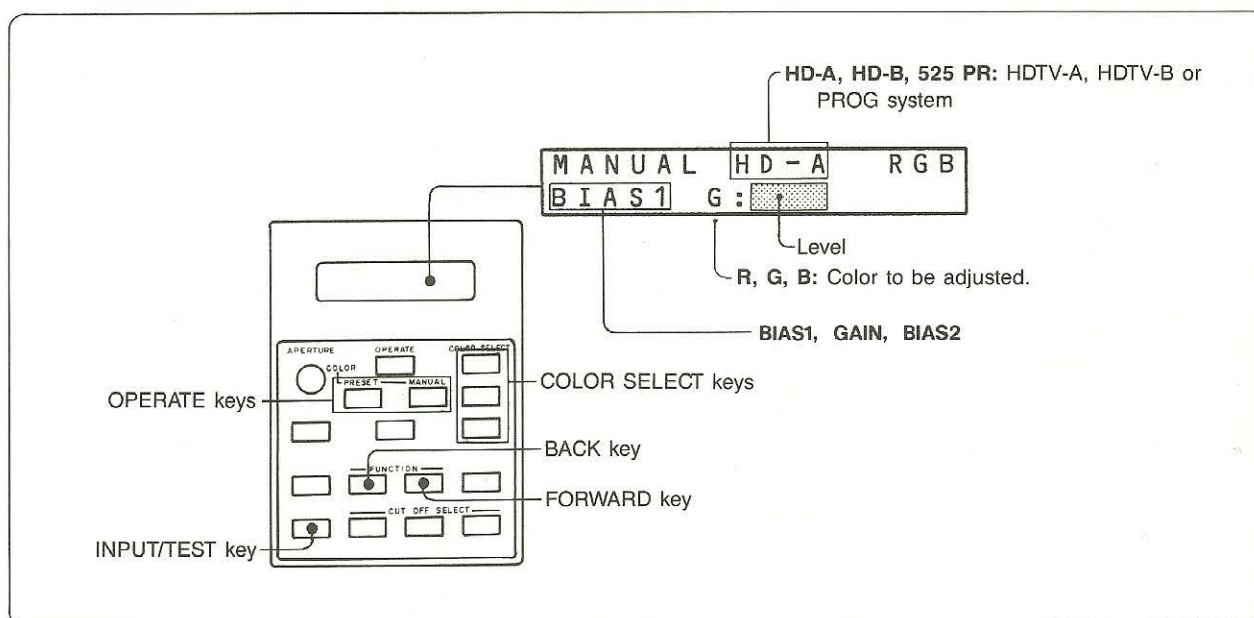


Color temperature adjustment mode

Press the MODE key after selecting MANUAL in the color temperature select mode to select the color temperature adjustment mode. In this mode, adjust the color temperature with bias 1 (black balance), gain (white balance), and bias 2.

Note

- Allow the unit for more than 30 minutes to start adjusting the color temperature after you turn on the unit.
- Adjust the color temperature with the contrast and brightness set to their preset levels.
- In the color temperature adjustment mode, the BRIGHTNESS MANUAL control on the front panel does not function. The control will become operative again when you press the MODE key after adjusting the color temperature.
- Use a color analyzer for more precise adjustment.



Bias 1 adjustment

- 1 Select the color temperature adjustment mode.

Bias 1 adjustment is possible. 0% setup signal will be displayed.

M A N U A L	H D - A	R G B
B I A S 1	G :	

- 2 Select a color to be adjusted by pressing a COLOR SELECT key.

- 3 Press OPERATE keys (and *) to adjust the level of the color. It is recommended that the brightness be set at approximately 0.5 NIT.

Gain adjustment

- 1 Press the FORWARD key after bias adjustment.

Gain adjustment is possible. 100% flat field signal will be displayed.

M A N U A L	H D - A	R G B
G A I N	G :	

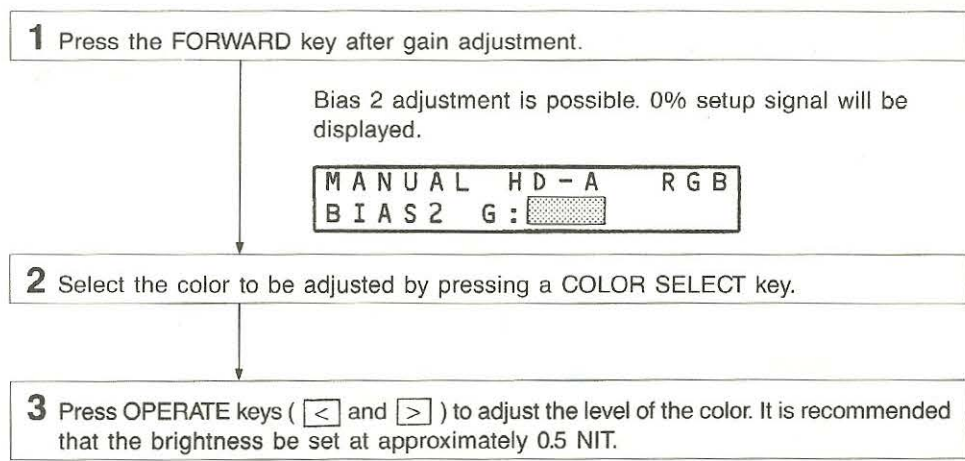
- 2 Select a color to be adjusted by pressing a COLOR SELECT key.

- 3 Press OPERATE keys (and) to adjust the level of the color. It is recommended that the brightness be set at approximately 0.5 NIT.

Find the color which is the lowest in level and decrease the levels of the other two colors. Use the PRESET CONTRAST control to adjust the brightness.

* Holding down or adjusts the data consecutively and pressing it adjusts the data step by step.

Bias 2 adjustment



Checking color temperature

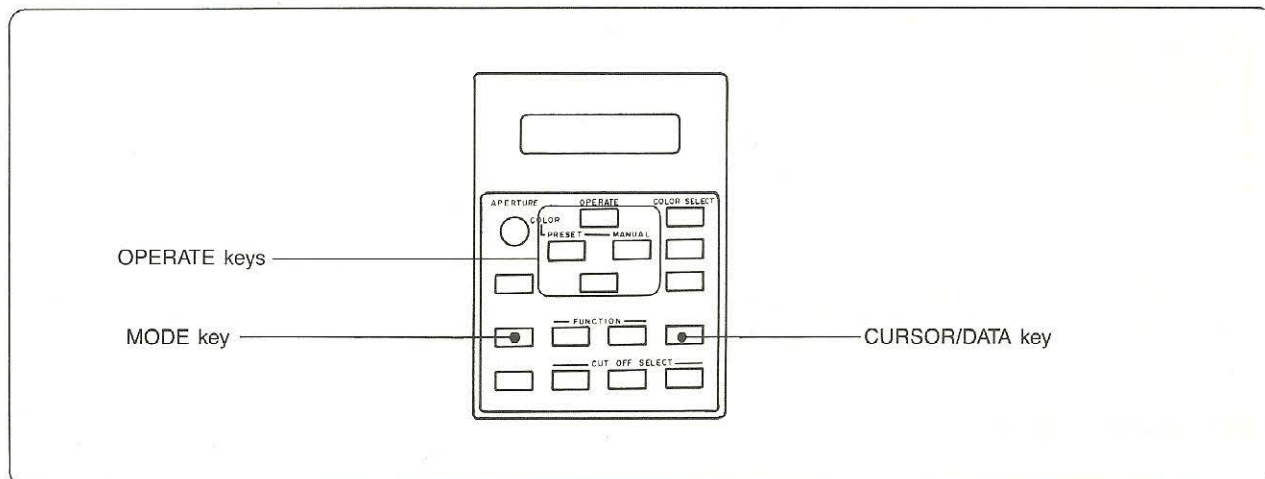
After bias 2 adjustment, press the INPUT/TEST key to display the gray scale signal and check the color temperature by monitoring the signal. If the color temperature is still not properly adjusted, repeat the gain and bias 2 adjustments and check the temperature again. Check the color temperature in modes other than the bias 1 and gain adjustment modes because the black balance stabilizer is deactivated in these modes.

Changing the signals

Besides using the setup and flat field signals, you can use gray scale signal or other input signals for color temperature adjustment. To use these signals, press the INPUT/TEST key in the color temperature adjustment mode. The signal will change as follows: Setup / flat field → gray scale → Input signal.

Copying the color temperature data

You can copy the adjusted color temperature data from one system to another. The data of R, G and B, and the data of bias 1, gain and bias 2 are copied altogether.



- 1 Select the color temperature select mode and select MANUAL by pressing the OPERATE key (\triangleright).

HDTV SYSTEM - A
COLOR-PRESET RGB

2 Selecting the destination

Set the INPUT A or B system selector to the system to which you want to copy the color temperature data.

Use the INPUT A system selector when A is selected with the INPUT selector on the front panel, and use the INPUT B system selector when B is selected.

- 3 Press the MODE key to select the color temperature adjustment mode.

MANUAL HD - A RGB
BIAS 1 G :

- 4 Press the OPERATE keys (\wedge and \vee) at the same time to set the unit in the copy mode.

The LCD will show the source system, and also the destination system selected in step 2.



Example When the data is copied from the HDTV-B system to the HDTV-A system.

MANUAL DATA COPY
HDTV - B → HDTV - A



Source system


Destination system selected in Step 2.

5 Changing the source system

Keep an OPERATE key ( or ) depressed to change the source system. If this is not necessary, skip this step.




The table below shows the source systems which correspond to the selected destination systems.

Destination	Source	
		
HDTV-A	PROG.	HDTV-B
HDTV-B	PROG.	HDTV-A
PROG.	HDTV-B	HDTV-A

When you change the source system, the LCD will show the following message. (This example shows that  was pressed in the example in step 4.)

```
PUSH CURSOR/DATA
PROG. → HDTV-A
```

6 Copying the data

Hold the CURSOR/DATA key down while pressing the same OPERATE key ( or ) as the one you pressed in step 5. If you skipped step 5, hold the CURSOR/DATA key down while pressing the OPERATE key indicating the source system in the table in step 5. (For example, press  to copy the data without changing the source system shown in the example in step 4.)

Hold the keys down until the the message on the LCD changes as follows.

```
COPYING DATA
HDTV-B → HDTV-A
```



```
COPY COMPLETE
HDTV-B → HDTV-A
```

7 Canceling the copy mode

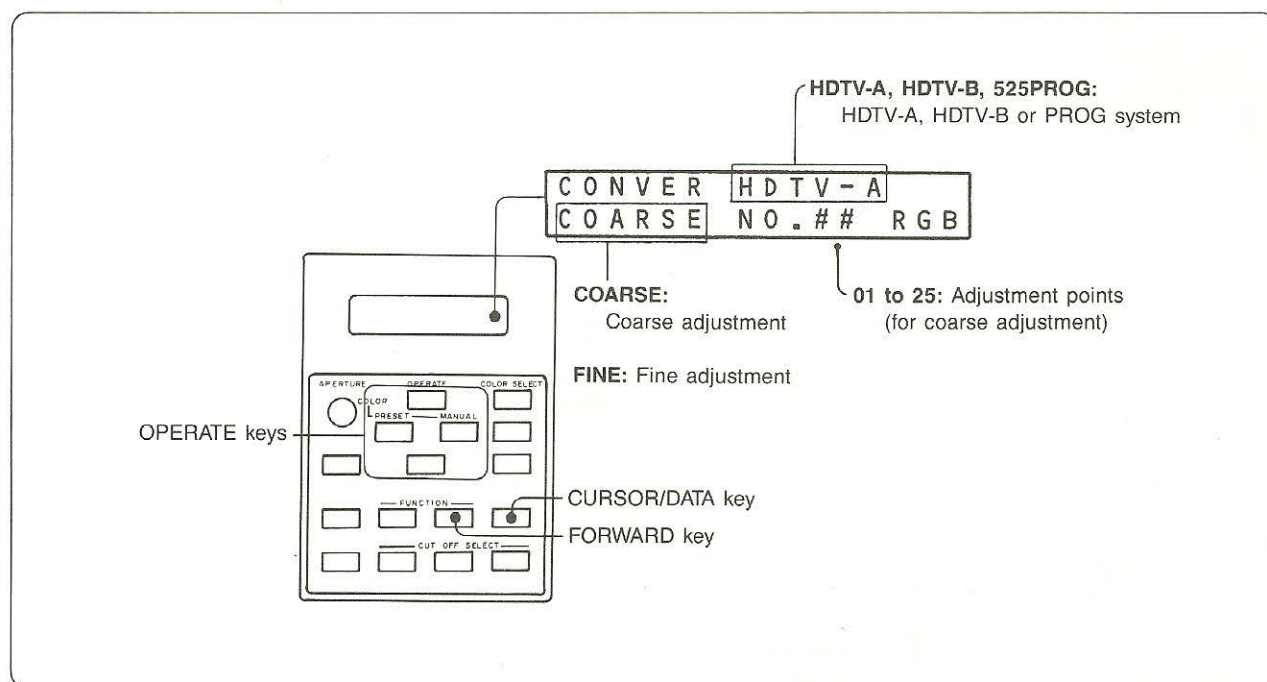
Press the MODE key to return to the color temperature adjustment mode.

The LCD shows the following message.

```
MANUAL HD-A RGB
BIAS1 G: 
```

1-5-3. Adjusting Convergence

In the convergence adjustment mode, adjust the convergence with the coarse and fine adjustments. Adjust the convergence for each system.



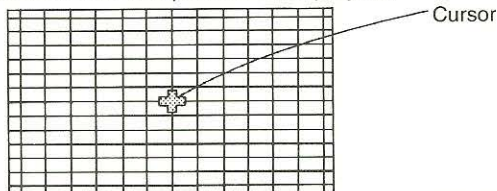
Coarse adjustment

1 Select the convergence adjustment mode.

Coarse adjustment is possible in this mode.

```
CONVER HDTV-A
COARSE NO.01 RGB
```

The crosshatch pattern is displayed.

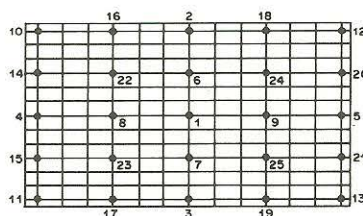


2 Press the appropriate OPERATE keys to adjust the convergence where the cursor is.

The red line moves in the same direction as it is indicated on the arrow key while the blue line moves in the opposite direction. Adjust the convergence so that both the red and blue lines converge on the green line.

3 Press the CURSOR/DATA key to move the cursor to the next adjustment point.

There are twenty-five adjustment points. Every time the key is pressed, the cursor moves in the following order. While the key is held down, the cursor moves in the opposite order.



Repeat steps 2 and 3 to adjust the convergence in each position.

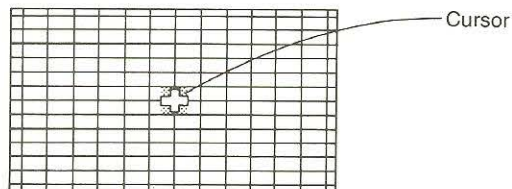
Fine Adjustment

1 Press the FORWARD key in the convergence adjustment mode.

Fine adjustment is possible.

C	O	N	V	E	R		H	D	T	V	-	A		
F	I	N	E		C	U	R	S	O	R		R	G	B

The cursor blinks at the center of the crosshatch pattern.



2 Press the OPERATE key to move the cursor to a point to adjust.

The cursor can be moved to every point.

3 Press the CURSOR/DATA key.

The cursor stops blinking and the LCD shows the following message.

C	O	N	V	E	R		H	D	T	V	-	A
F	I	N	E		D	A	T	A		R	G	B

4 Press the appropriate OPERATE keys to adjust the convergence where the cursor is.

5 Press the CURSOR/DATA key again.

The cursor starts blinking again. Repeat steps 2 to 5 to adjust the convergence at each point.

Note

When the cursor starts blinking during convergence adjustment, the convergence adjustment by using the OPERATE keys is complete. If you need more precise adjustment, see the convergence adjustment in section 4.

1-5-4. Resetting the Adjustment Data

You can reset the color temperature and convergence data which you have adjusted. The data is reset as follows.



Data	Data after resetting	Notes
Color temperature	Preset data	The data of R, G and B, and the data of bias 1, gain and bias 2 are set to the preset level.
Convergence	The center position within adjustable range	Data at all point is reset at once.

Selecting the data to reset

The color temperature and convergence data can be reset in each system independently, and the coarse and fine adjustment data of convergence can also be reset independently. Select the system by setting the INPUT A or B system selector and select each adjustment mode before resetting the data. (The LCD must show the following message.)

Data	Mode	LCD
Color temperature	Color temperature adjustment mode	<div>MANUAL HD-A RGB</div> <div>BIAS 1 G:</div> <div>BIAS 1, ↑ GAIN or BIAS 2 ↓-RGB</div>
Convergence coarse adjustment data	Convergence adjustment mode (Coarse adjustment)	<div>CONVER HDTV-A</div> <div>COARSE NO. ## RGB</div> <div>↓ 1~25</div>
Convergence fine adjustment data	Convergence adjustment mode (Fine adjustment)	<div>Press the CURSOR/DATA key to stop the cursor blinking.</div> <div>CONVER HDTV-A</div> <div>FINE DATA RGB</div>

Resetting the data

- 1 Hold the OPERATE keys ( and ) down.

The LCD shows the following message.

RESET OK?
Keep < > pushing

- 2 Hold the keys down for about a second until the following message appears.

RESET
COMPLETE

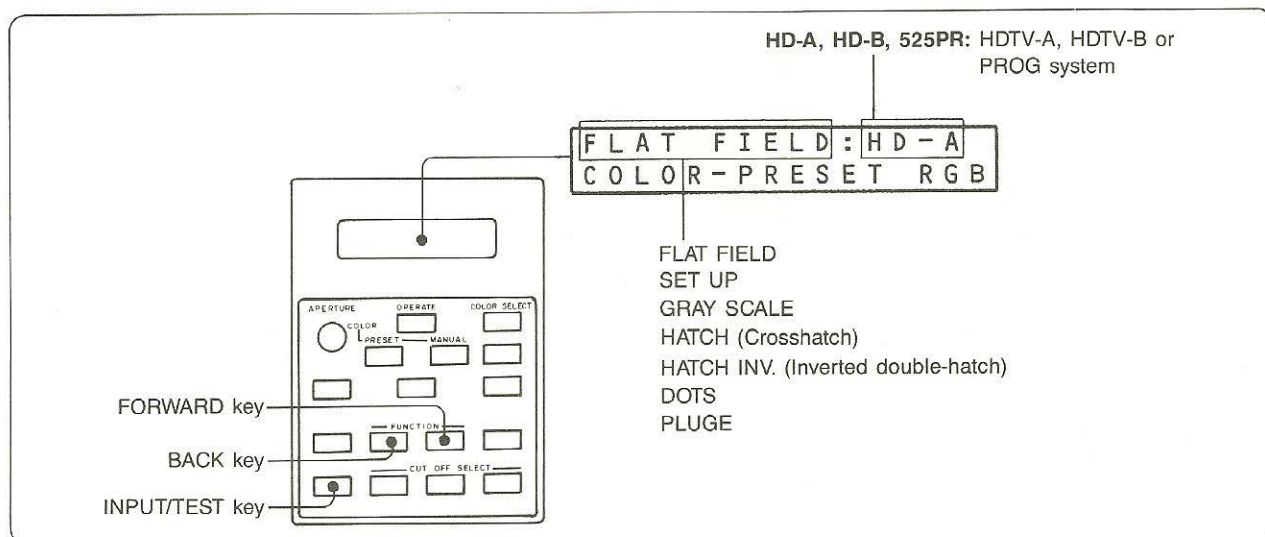
The data is reset.

To stop the operation before resetting the data

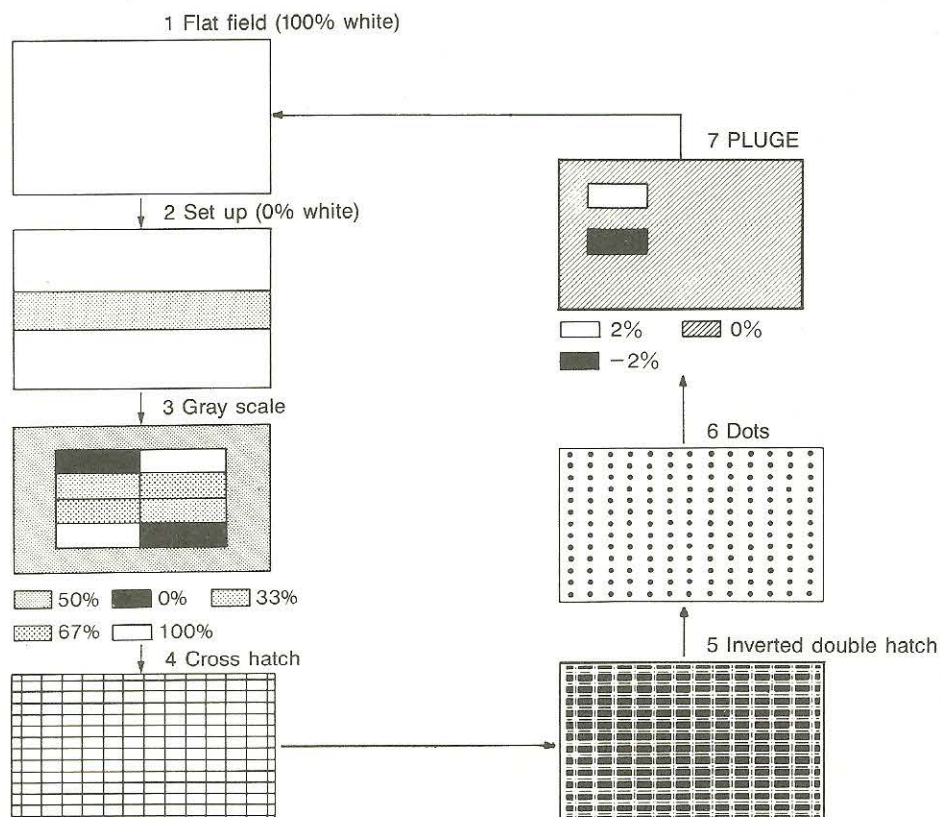
Release the OPERATE keys before the above message appears.

1-5-5. Checking the Unit with the Internal Test Signals

The unit has a test signal generator which generates seven test signals. You can monitor the test signals in the test mode to check the unit. Press the INPUT/TEST key in the color temperature select mode to select the test mode.

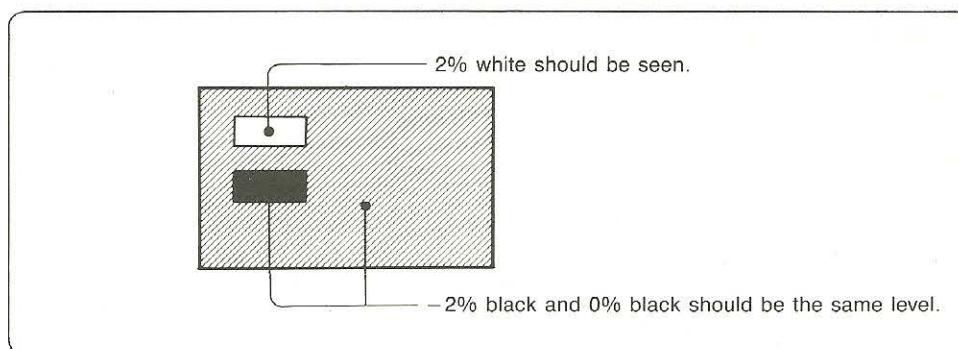


Every time you press the FORWARD key, the pattern changes in the order shown below. Pressing the BACK key changes the signal in the opposite order.



Adjusting the brightness using the PLUGE signal

To adjust the brightness with the BRIGHTNESS MANUAL control on the front panel, use the PLUGE signal and adjust so that the signal becomes the following condition.



1-6. Specifications

System	1125 lines, 60 fields/sec, interlaced 1 HDTV studio standard (BTA/SMPTE standard) 2 Old HDTV standard (only the RGB input)
CRT	525 lines, 60 frames/sec., non-interlaced Super Fine Pitch Trinitron 0.46 mm phosphor trio pitch, 90° deflection, 36.5 ϕ in-line gun Effective picture size: 477.2 \times 852.6 mm (h/w) (18 $\frac{7}{8}$ \times 33 $\frac{5}{8}$ inches) 977.1 mm (38 $\frac{1}{2}$ inches) measured diagonally

Input connectors and signals

Connectors

G/Y, B/P _B , R/P _R	BNC (2), 75 ohms or high impedance (with bridge-through output)
EXT SYNC	BNC (1), 75 ohms or high impedance (with bridge-through output)
HD, VD	BNC (1), 75 ohms

Video signals

HDTV	GBR: Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p Sync signal is ± 0.3 Vp-p ± 6 dB tri-level bipolar sync or 0.3V ± 6 dB sync, negative Y/P _B /P _R : Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p P _B and P _R is ± 0.3 Vp-p, and the sync signal is ± 0.3 V ± 6 dB tri-level bipolar sync
525 lines, non-interlaced	R/G/B: Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p The sync signal is 0.3 ± 6 dB sync, negative

Sync signal

EXT SYNC	± 0.3 V ± 6 dB tri-level bipolar sync or 0.3 ± 6 dB sync, negative
HD, VD	4 Vp-p ± 6 dB sync, negative

Video signal

Frequency response	60 Hz to 30 MHz ± 3 dB (from video input to RGB final stage when the APERTURE is OFF.)
Waveform distortion	Overshoot: Less than 10% Sag: Less than 2% (at RGB final stage when a square wave (rise time: 0.01 μ sec) is input.)
Noise	Less than -55 dB (p-p/p-p) (RGB final stage, with video input terminated with 75-ohm)
Matrix error (Y/P _B /P _R)	Within 3%

Deflection and high voltage

Minimum sync level	Internal sync: -10 dB External sync: -10 dB
Deflection distortion	Within a central area bounded by a circle whose diameter equals the picture height, within 1% of the picture height (only in the HDTV system)
Picture size	5% overscan
Interlace	Within 55:45 (only in the HDTV system)
Retrace time	Horizontal: Less than 3.77 μ sec. Vertical: Less than 6590 μ sec.
Anode voltage	32 ± 0.2 kV
EHT load regulation	Less than 1%
Convergence	Center: Less than 0.7 mm (less than 0.5 mm by re-adjustment) Corners: Less than 1.0 mm
Luminance	20 Ft-L (When 100% white is input at preset level)
Color temperature	6500K + 8MPCD (preset, when HDTV-A or HDTV-B is selected) 9300K + 8MPCD (manual, when PROG is selected)
Nominal chromaticity coordinates	

	X	Y
R	0.630	0.340
G	0.310	0.515
B	0.155	0.070

Resolution	Center Horizontal: More than 1000 TV lines Vertical: More than 750 TV lines Corners Horizontal: More than 950 TV lines Vertical: More than 700 TV lines
------------	--

Environment

Operating temperature	0°C to 40°C (32°F to 104°F)
Optimum temperature range	20°C to 30°C (68°F to 86°F)
Operating humidity	10% to 85%
Storage temperature	– 20°C to + 60°C
Altitude	Lower than approx. 3,050 m (10,000 feet)

Others

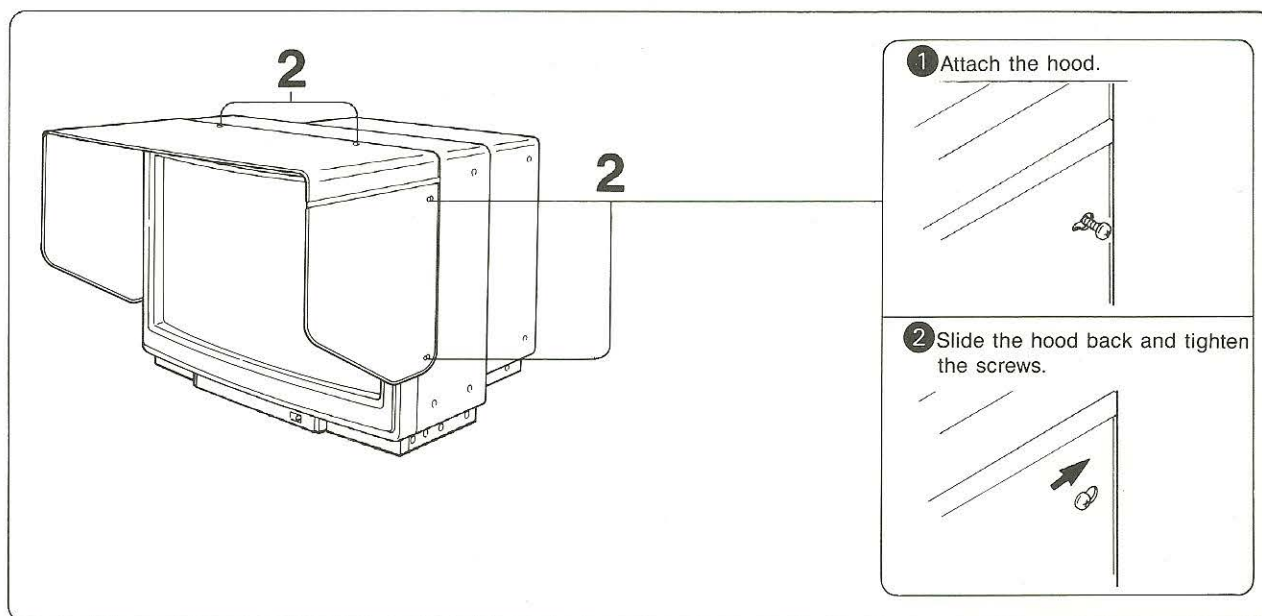
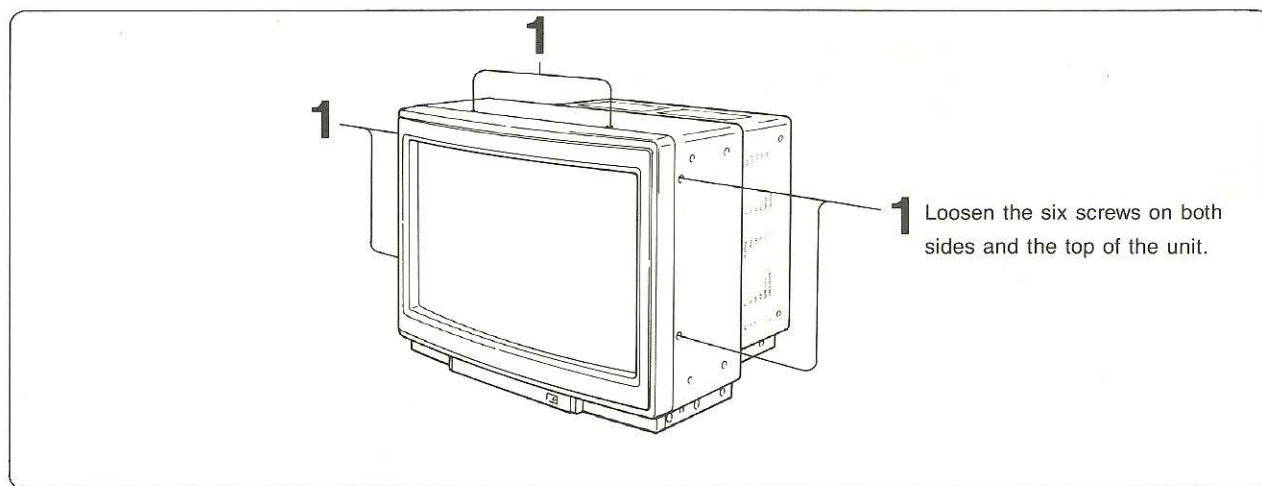
Warm up time	More than 30 minutes
Power requirements	90 to 132V or 198 to 264V AC selectable, 50/60 Hz
Power consumption	350W
Battery life for nonvolatile memory	More than five years
Weight	184 kg (405 lb 8 oz)
Dimensions	1030 × 764 × 865 mm (w/h/d) (40 5/8 × 30 1/8 × 34 1/8 inches)
Supplied accessories	Fuse (2) (6.3A/125V and T4/A250V) AC power cord (1) 75-ohm terminators (4) Operation and maintenance manual Screwdriver (1) Monitor hood (1) Carrying handles (1 set)

Design and specifications subject to change without notice.

1-7. Attaching the Supplied Accessories

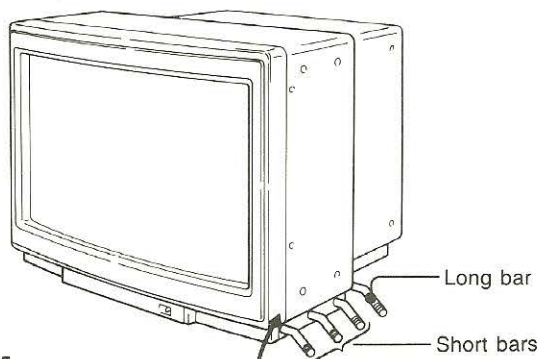
1-7-1. Attaching the Monitor Hood

To prevent ambient light from reflecting on the screen, attach the supplied monitor hood as follows.

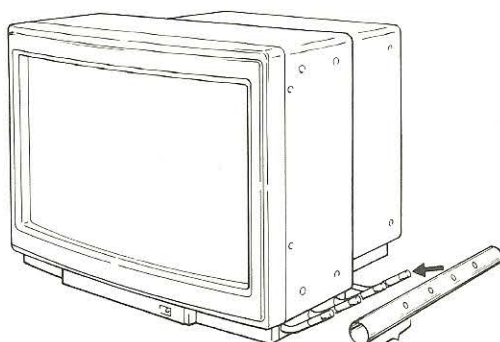


1-7-2. Attaching the Carrying Handles

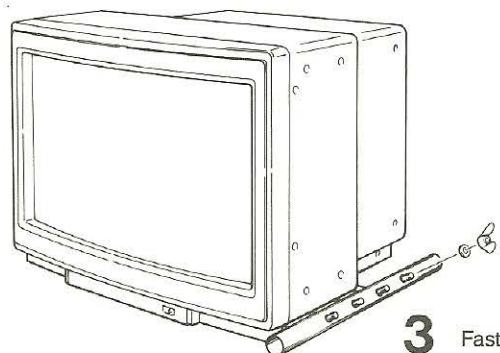
Attach the supplied carrying handles as follows to carry the monitor. The unit weighs 184 kg (405 lb 8 oz) and requires 8 persons or more to carry. (The illustration below shows the one side of the monitor. Do the same at the other side, too.)



1 Insert the bars with the curved portion toward you and turn them upward by 90 degrees.



Set this side (longer than the other side) front.

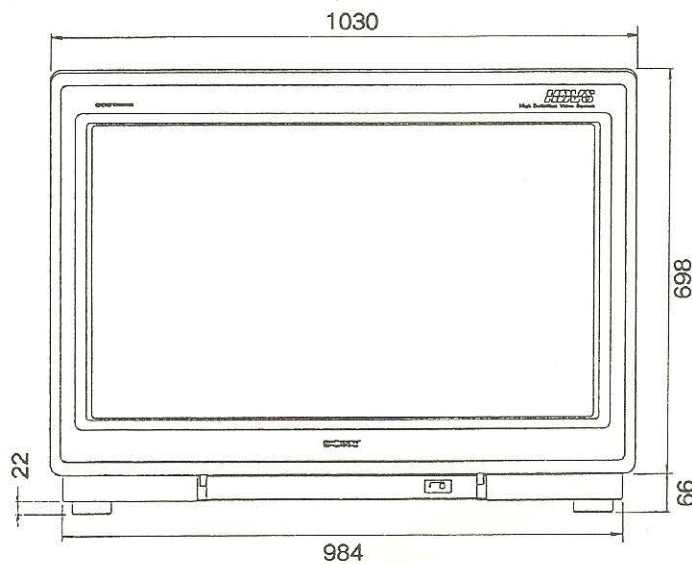


SECTION 2

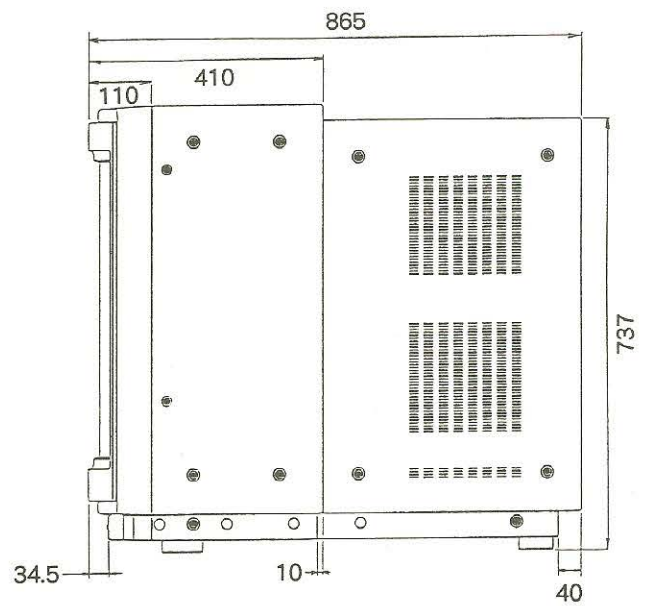
EXTERNAL DIMENSIONAL DIAGRAM AND DISASSEMBLY

2-1. EXTERNAL DIMENSIONAL DIAGRAM

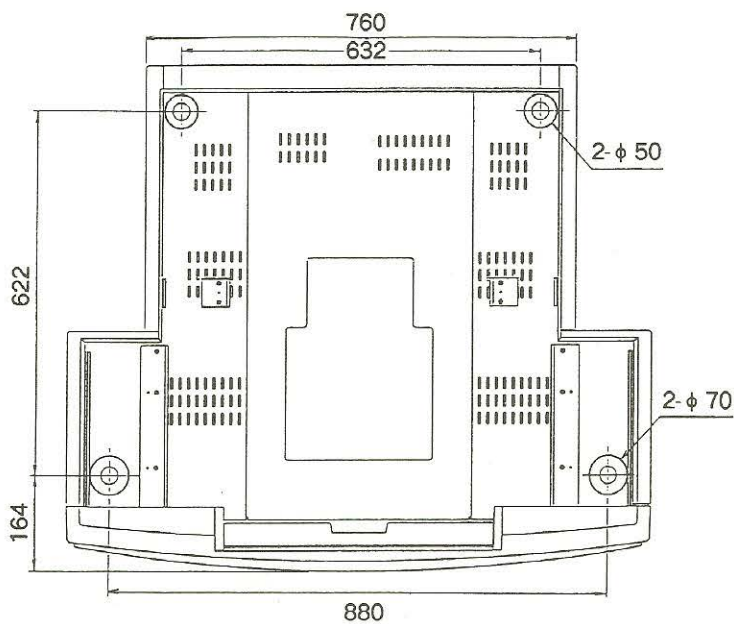
(Front side)



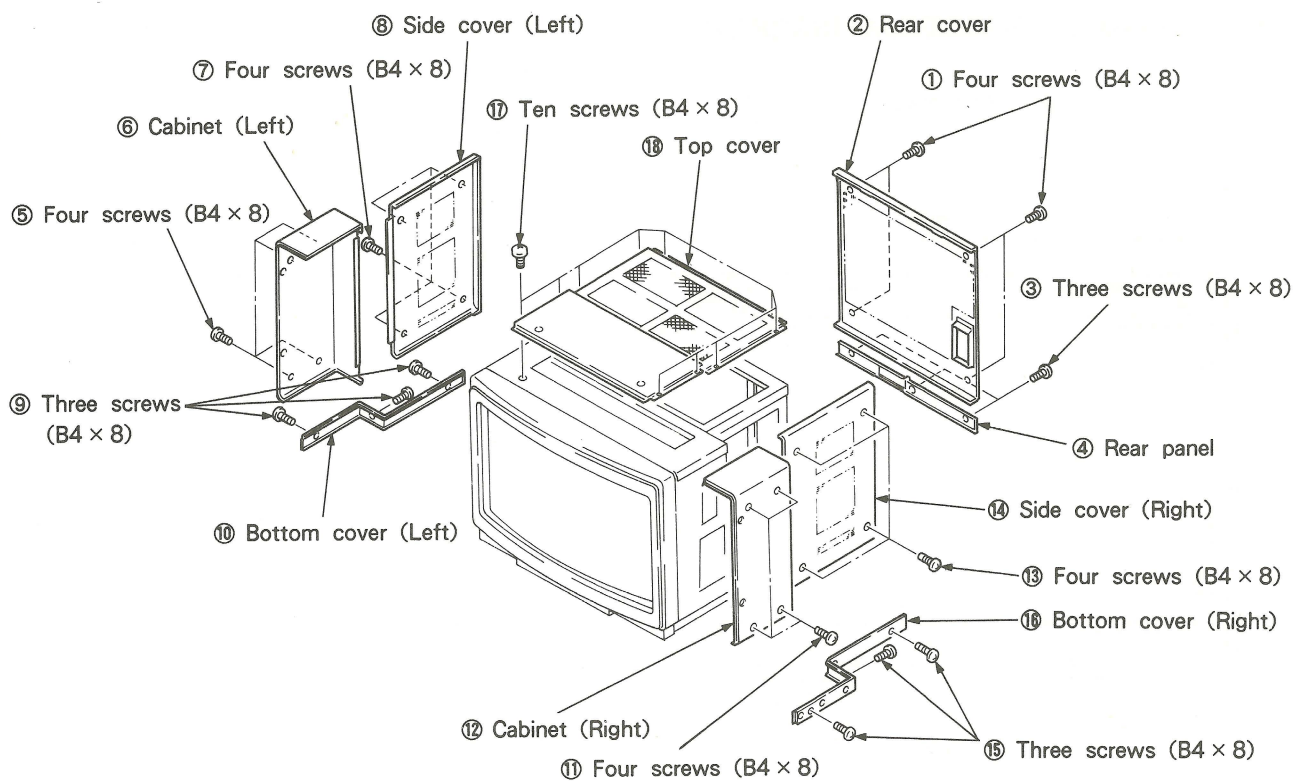
(Side)



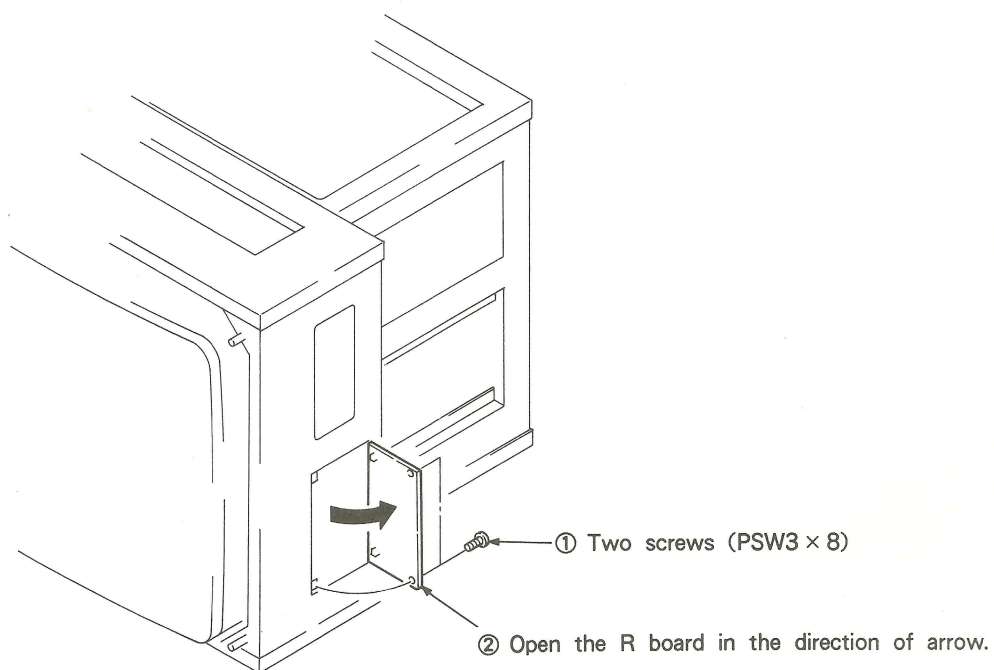
(Bottom side)



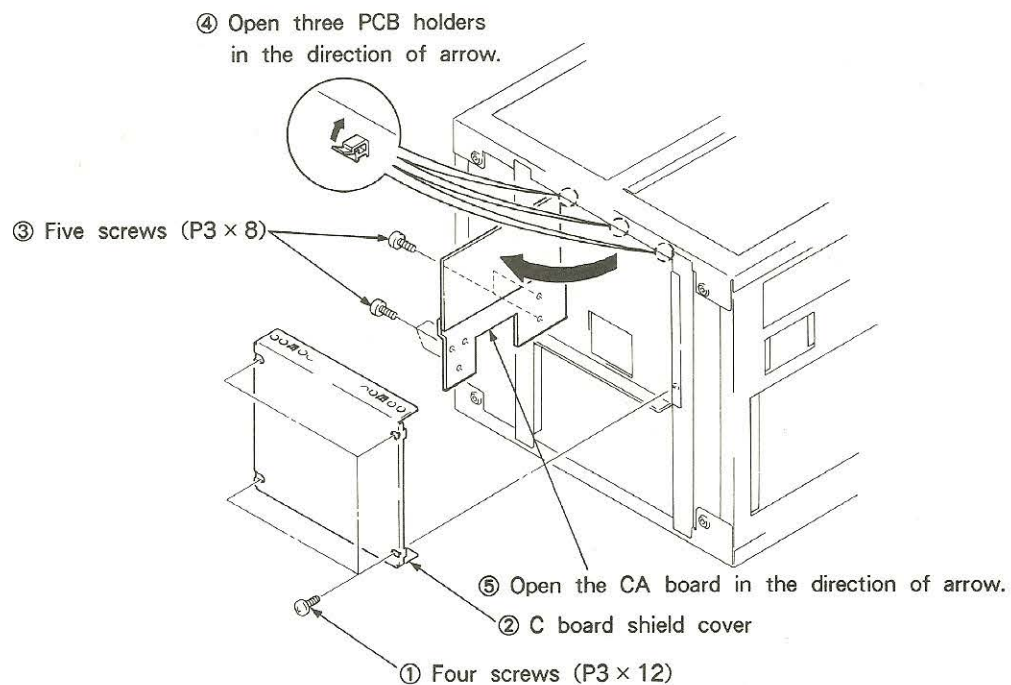
2-2. REMOVAL OF THE COVER



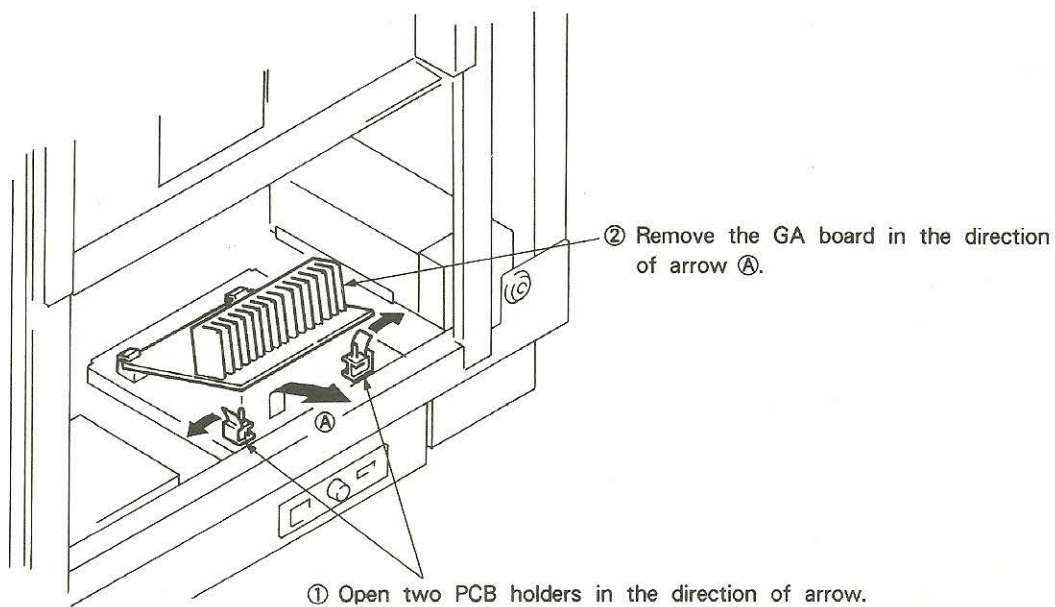
2-3. INSPECTION METHOD OF THE R BOARD



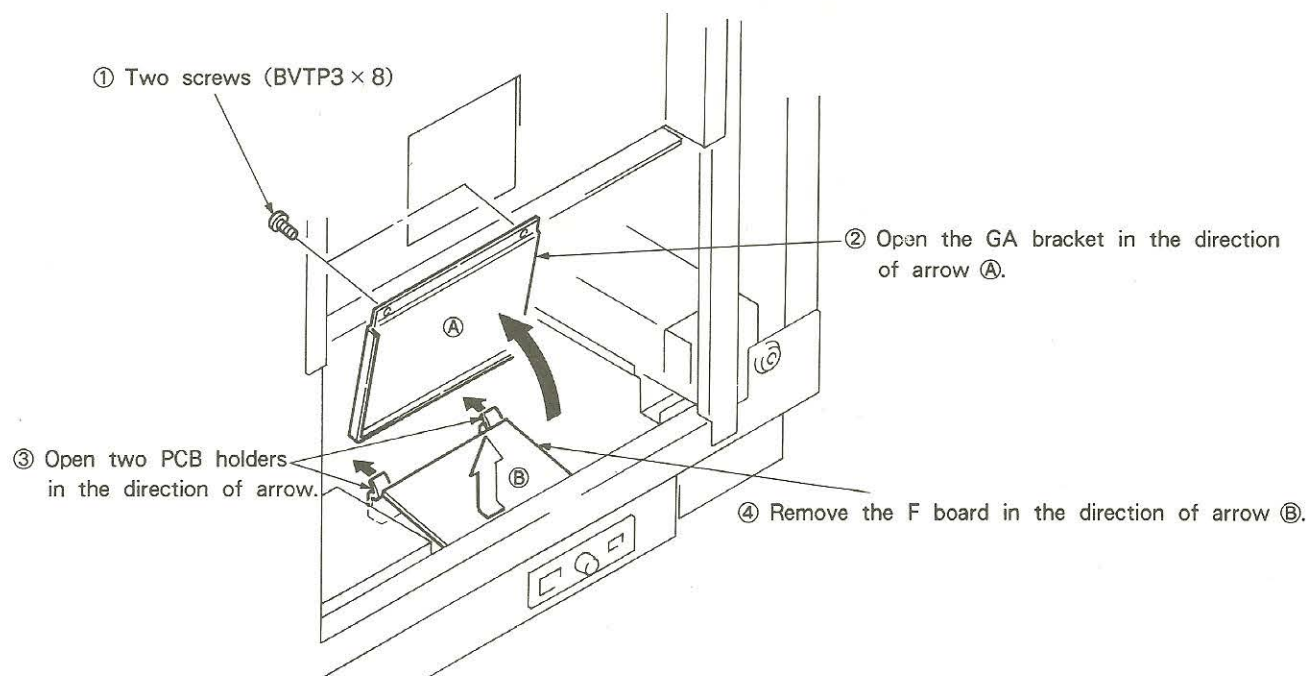
2.4. INSPECTION METHOD OF THE CA BOARD



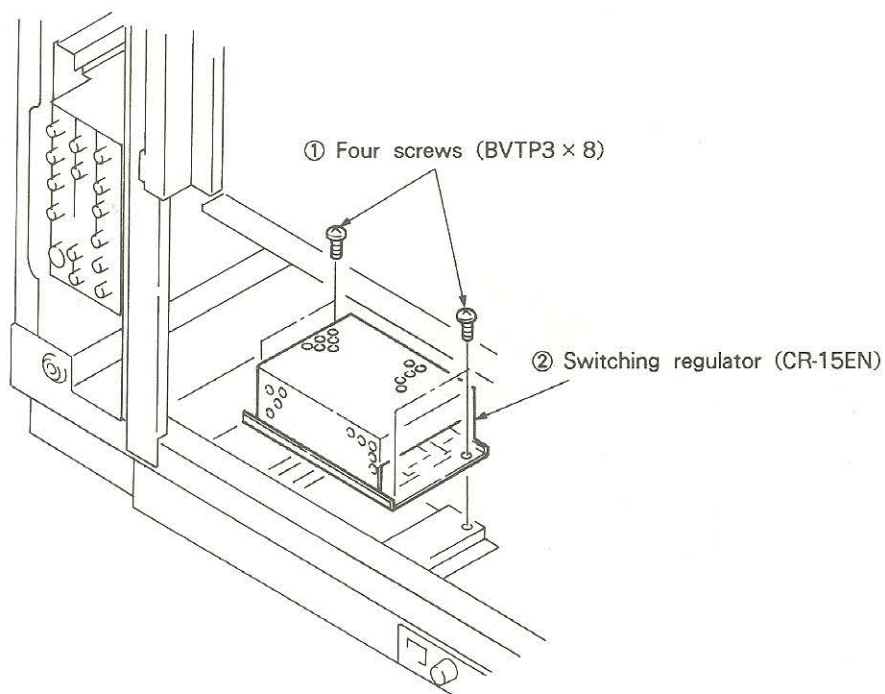
2.5. REMOVAL OF THE GA BOARD



2-6. REMOVAL OF THE F BOARD

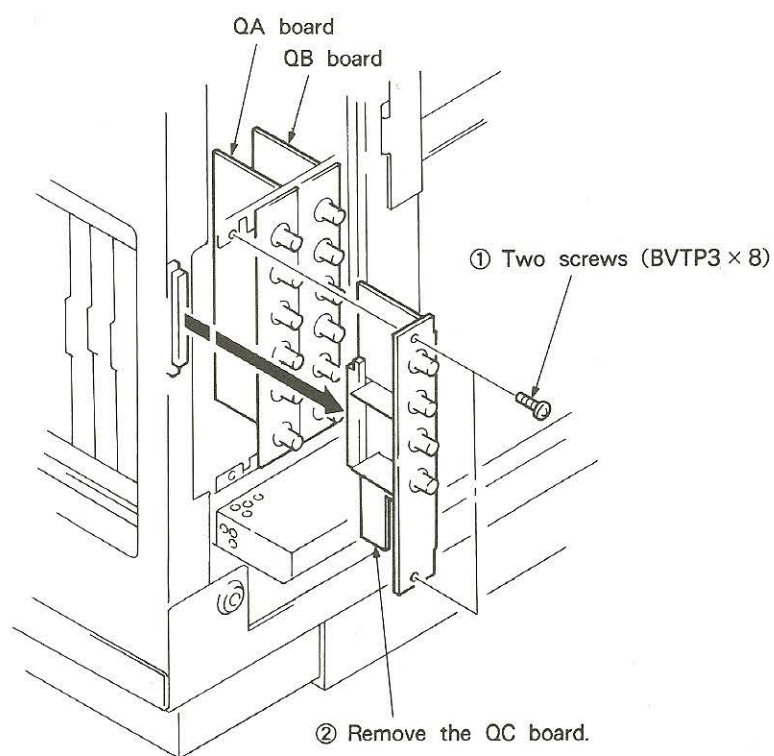


2-7. REMOVAL OF THE SWITCHING REGULATOR (CR-15EN)

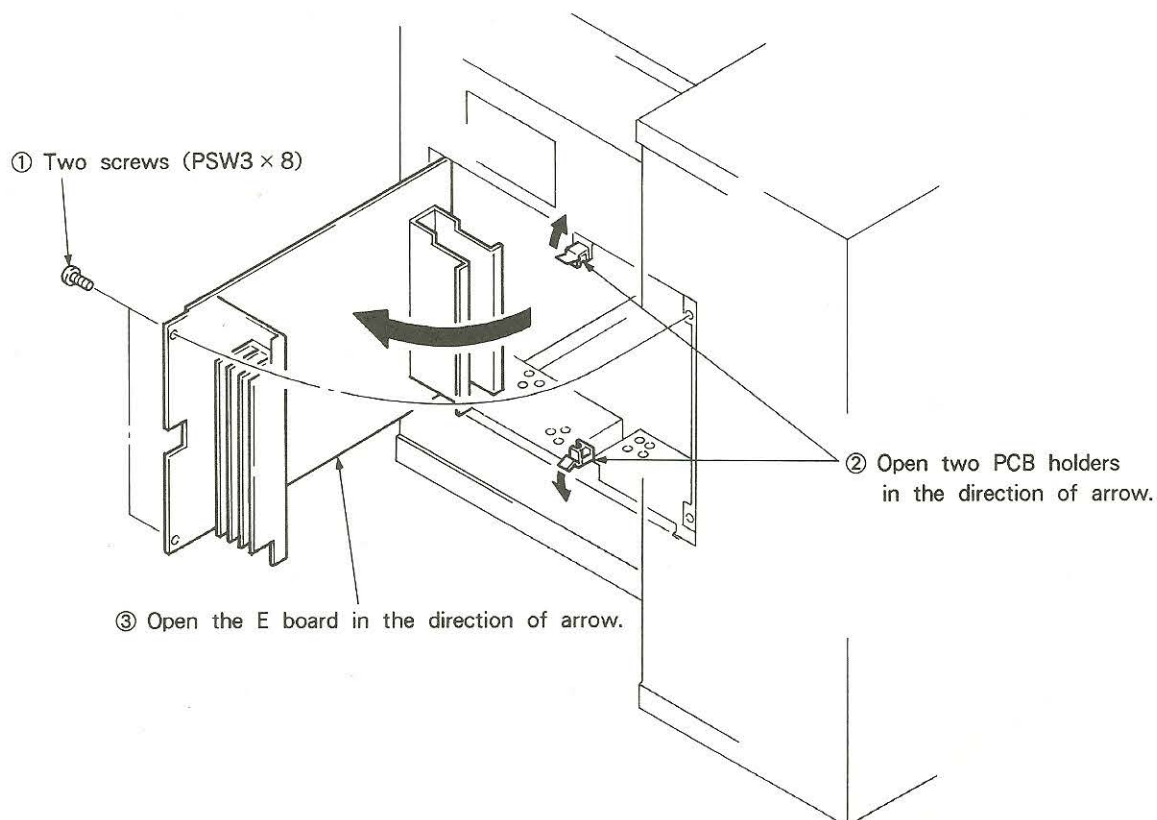


2-8. REMOVAL OF THE QC BOARD

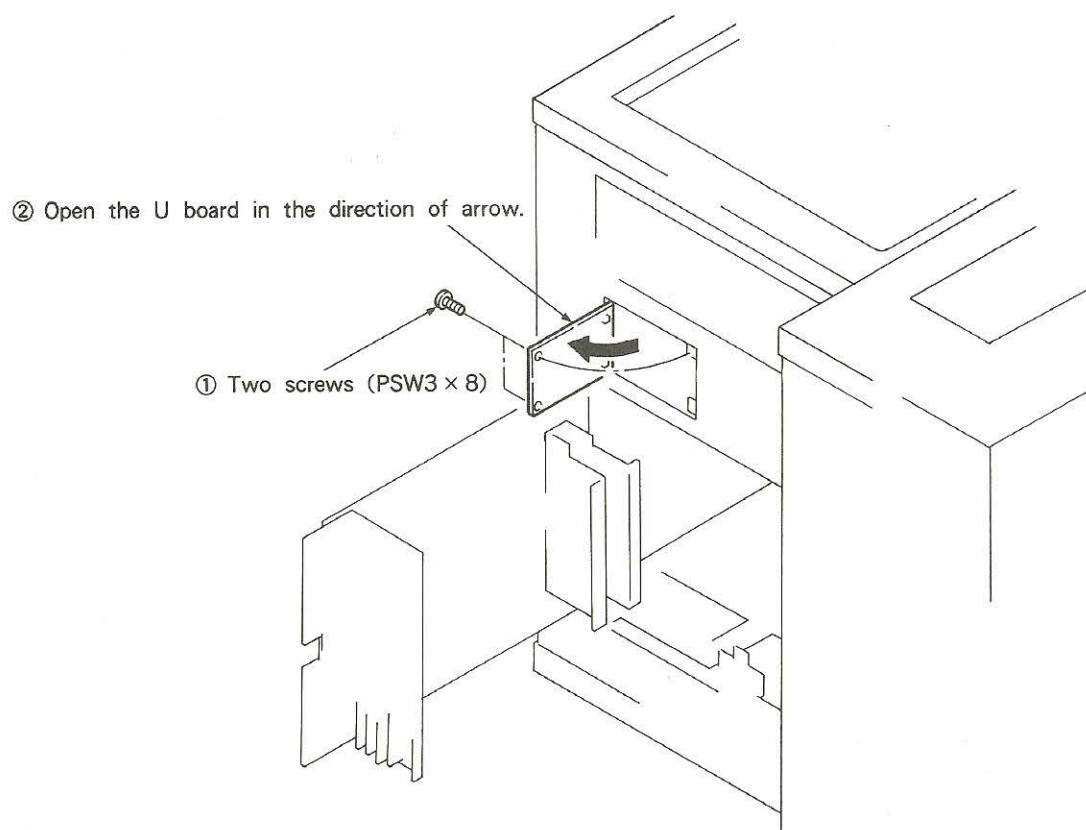
Note : The QA and QB boards can be removed in the same way of the QC board.



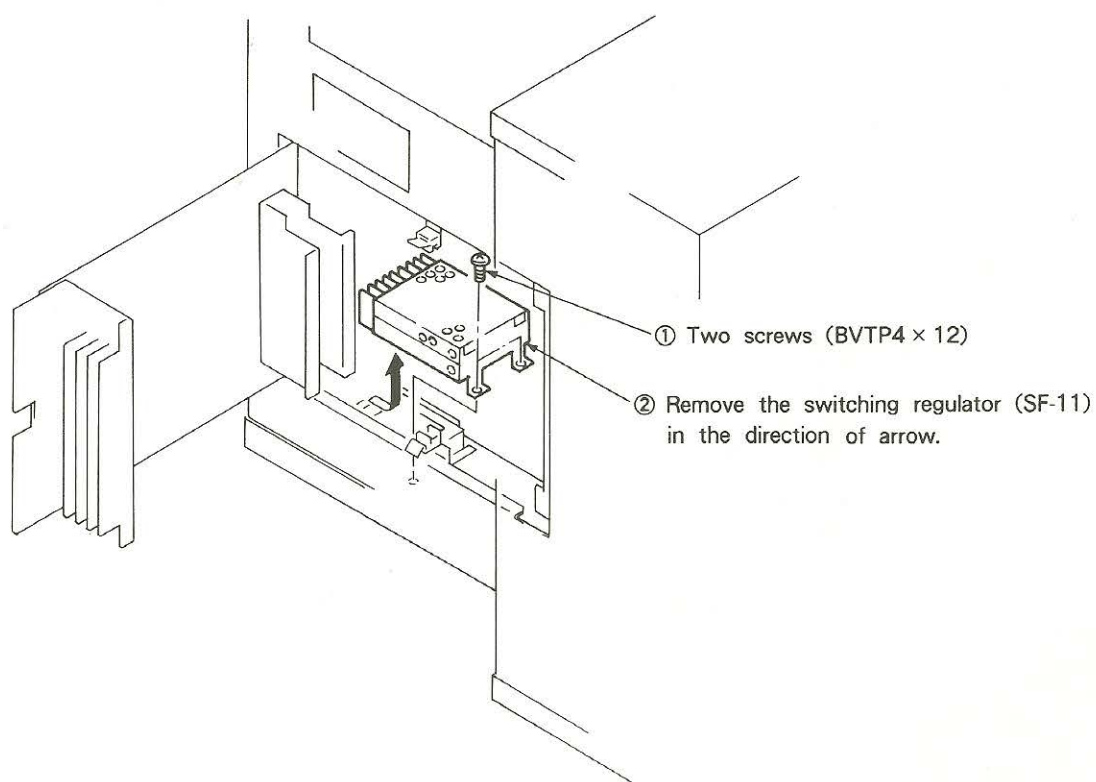
2-9. INSPECTION METHOD OF THE E BOARD



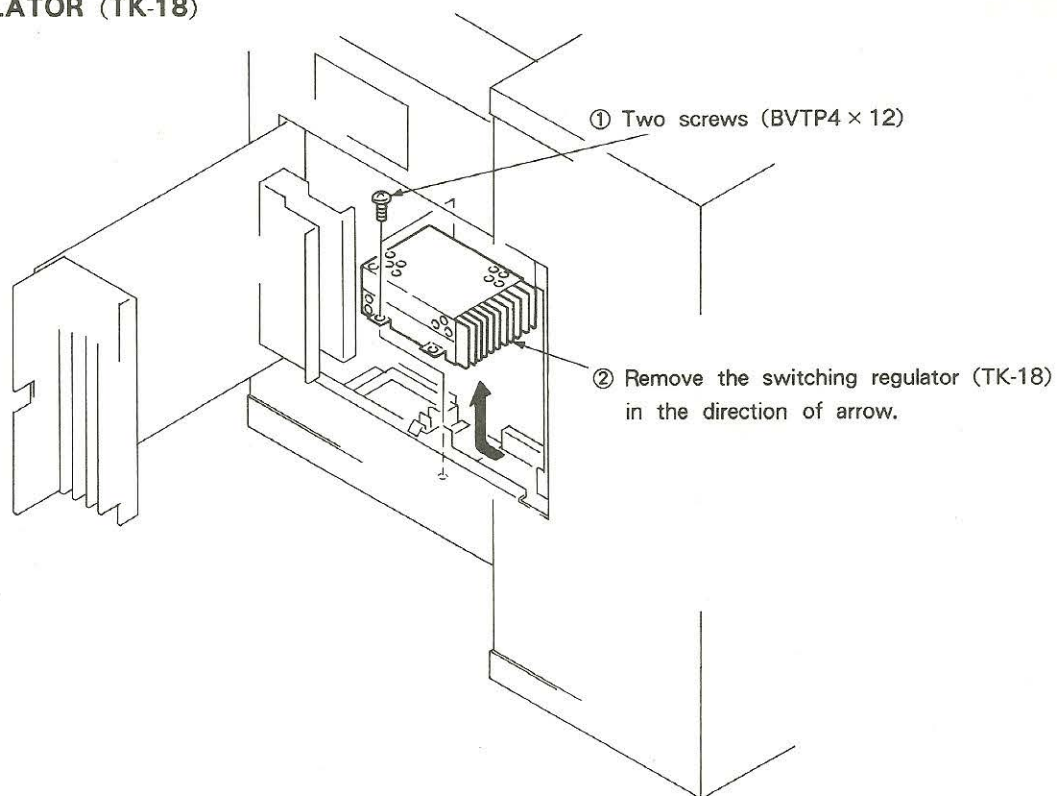
2-10. INSPECTION METHOD OF THE U BOARD



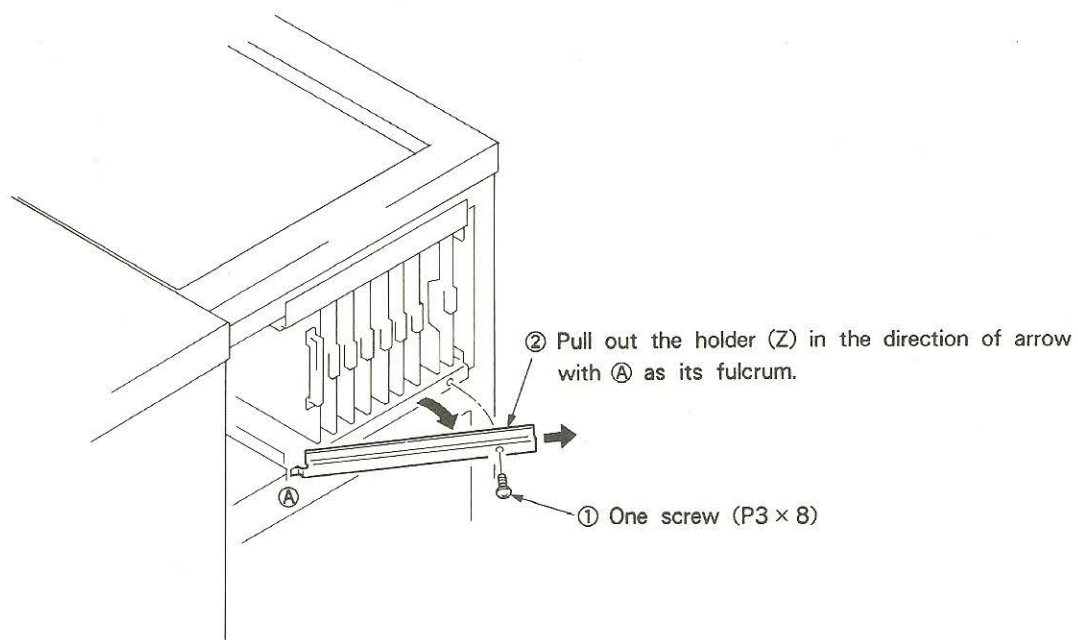
2-11. REMOVAL OF THE SWITCHING REGULATOR (SF-11)



2-12. REMOVAL OF THE SWITCHING REGULATOR (TK-18)

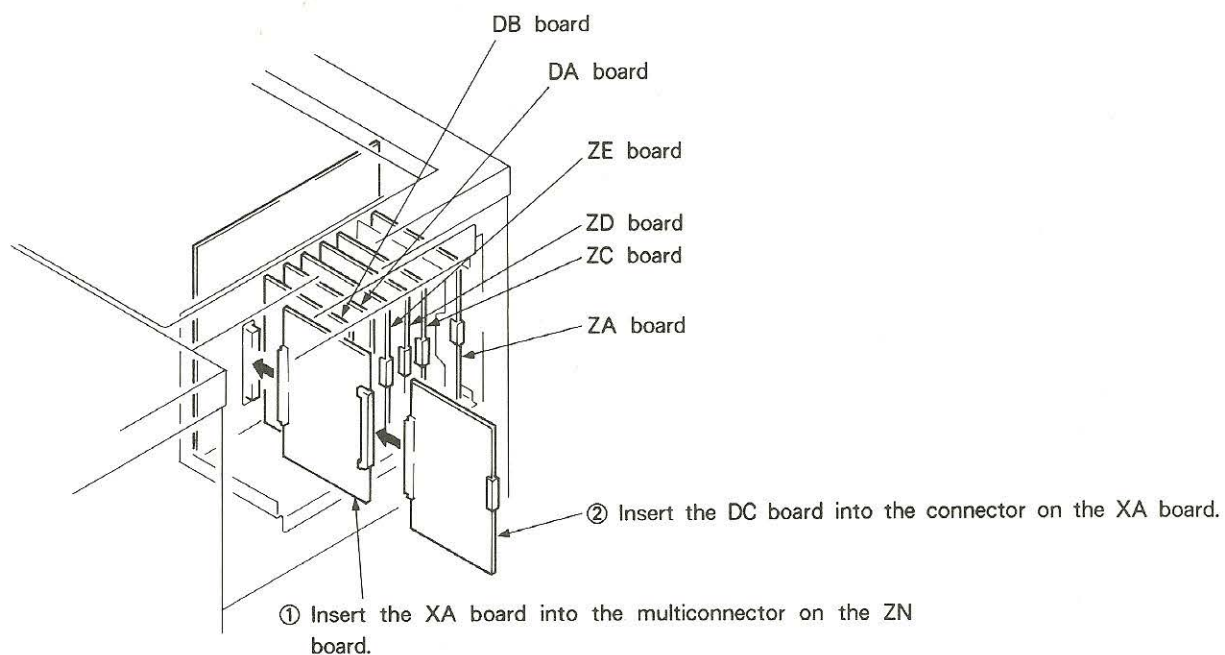


2-13. REMOVAL OF THE HOLDER (Z)

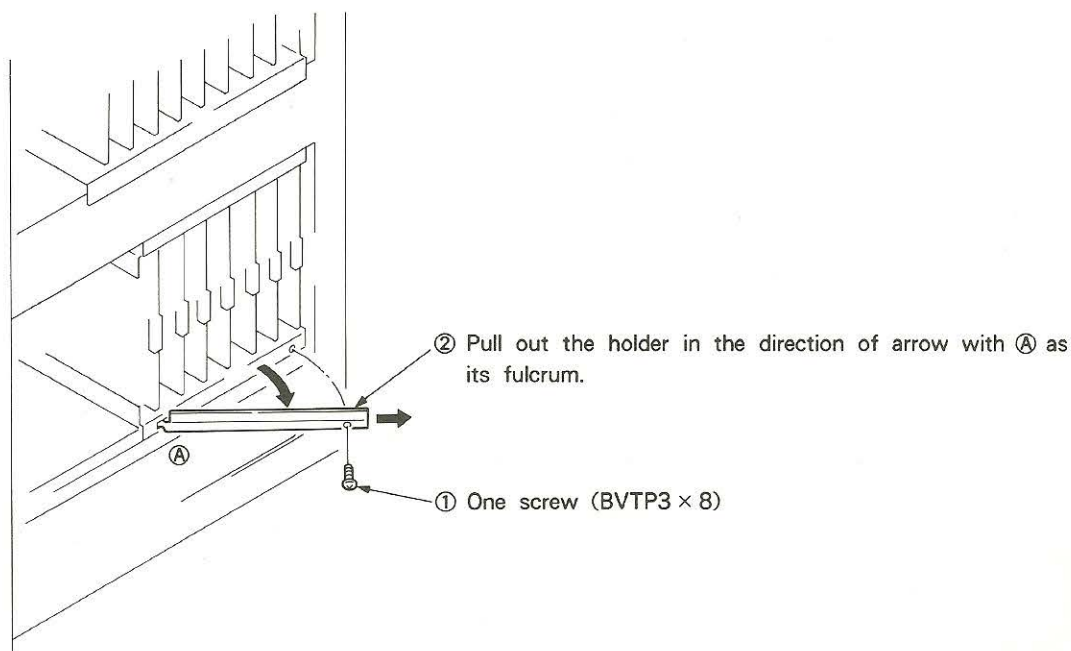


2-14. INSPECTION METHOD OF THE DC BOARD

Note : Boards DA, DB, ZA, ZC, ZD and ZE can similarly be inspected.

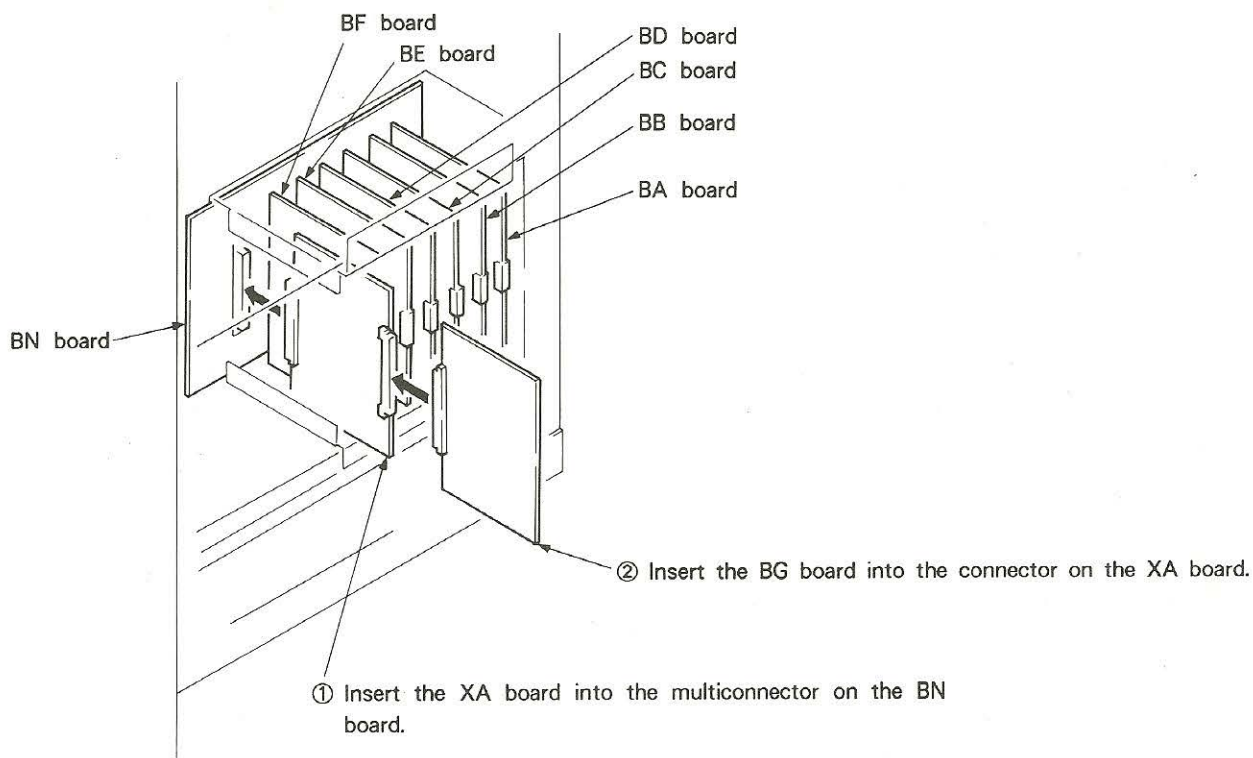


2-15. REMOVAL OF THE HOLDER

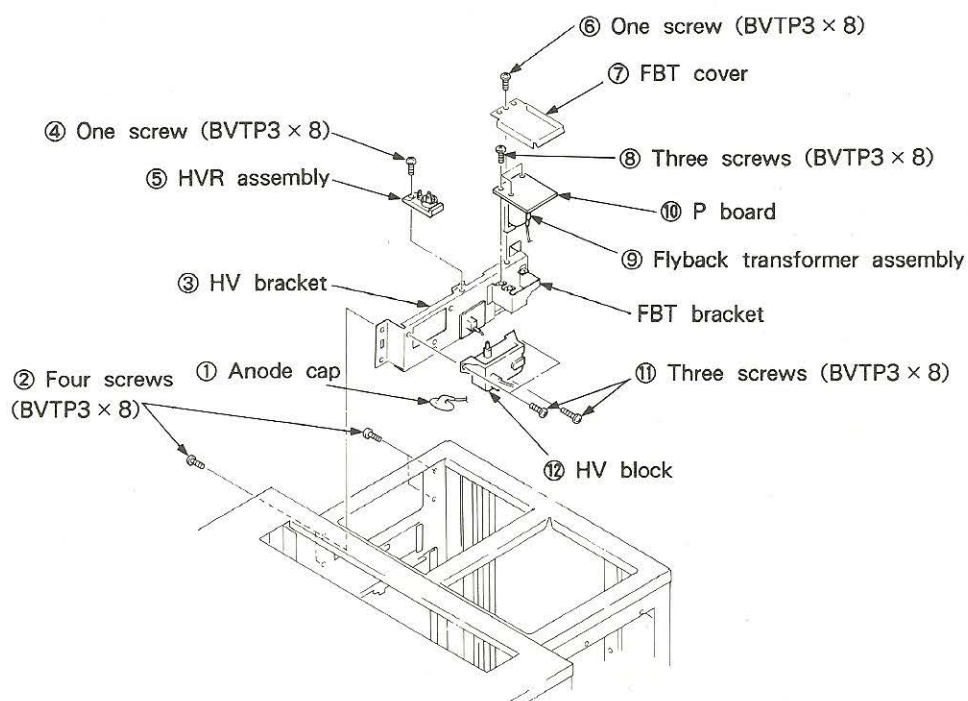


2-16. INSPECTION METHOD OF THE BG BOARD

Note: Boards BA, BB, BC, BD, BE and BF can similarly be inspected.

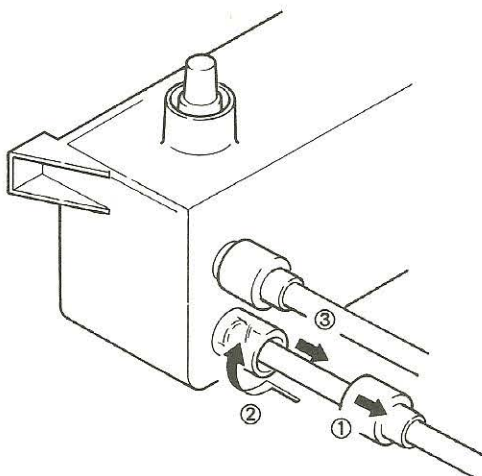


2-17. REMOVAL OF FLYBACK TRANSFORMER AND HV BLOCK



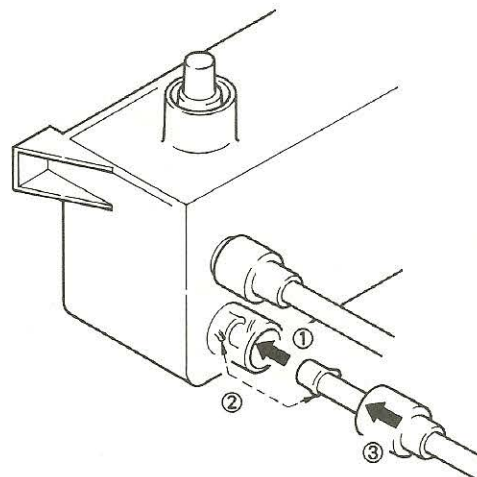
2-18. INSTALLING AND REMOVAL METHOD OF HIGH VOLTAGE CABLE

(1) Removal



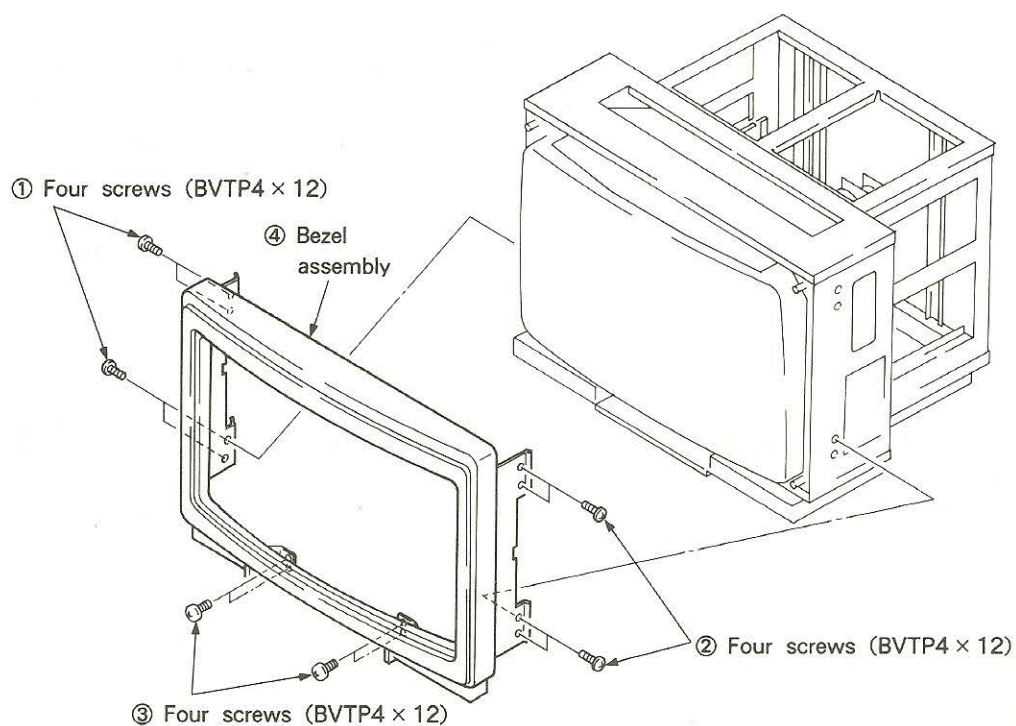
While pushing cable with ② and ③, turn 90° and pull out.

(2) During insertion

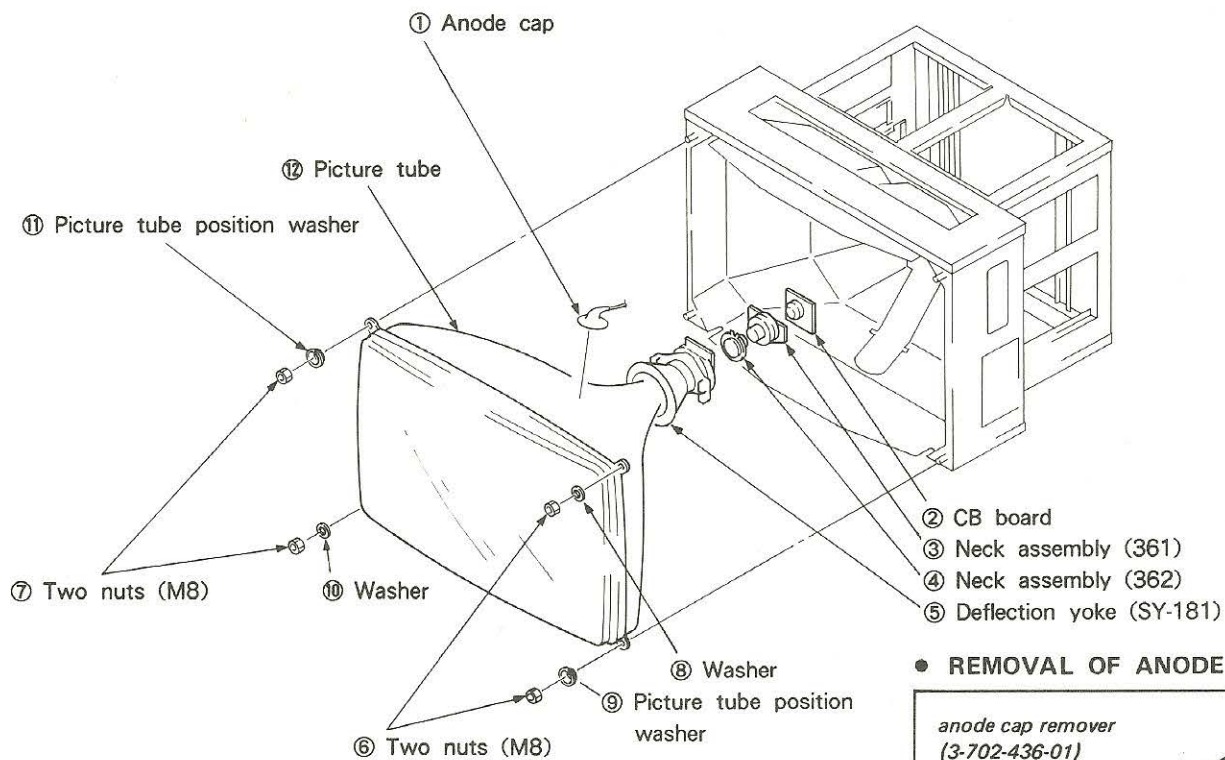


Confirm with ② that it is locked.

2-19. REMOVAL OF THE BEZEL ASSEMBLY

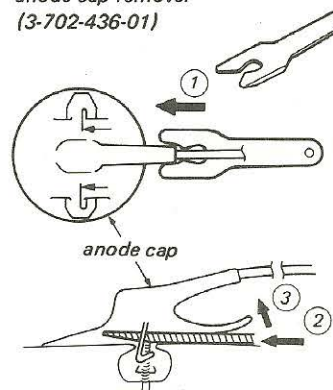


2-20. REMOVAL OF THE PICTURE TUBE



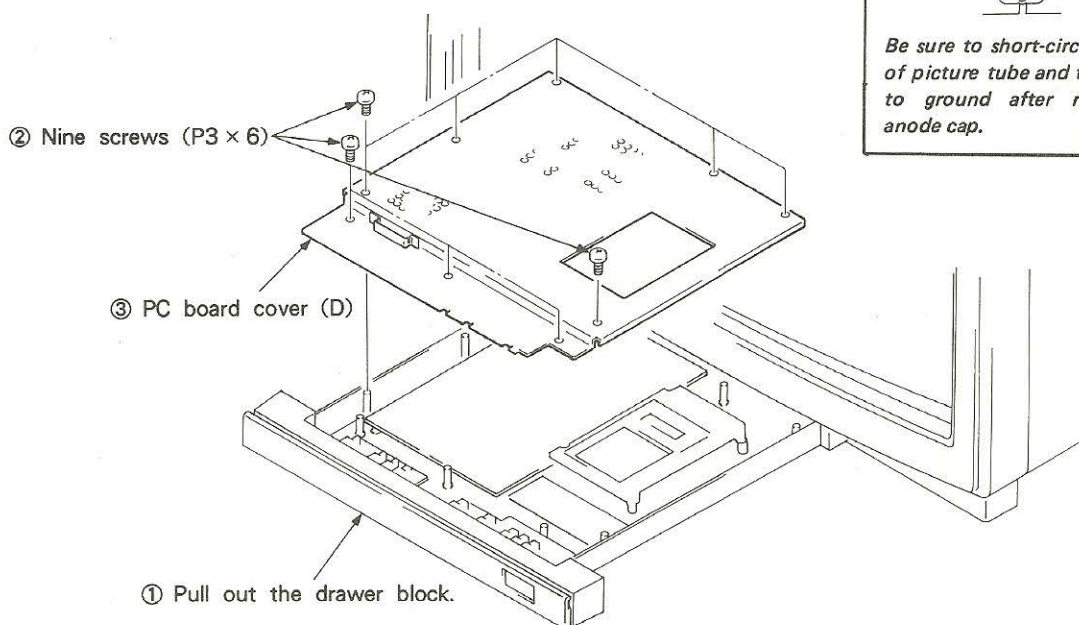
• REMOVAL OF ANODE CAP

*anode cap remover
(3-702-436-01)*

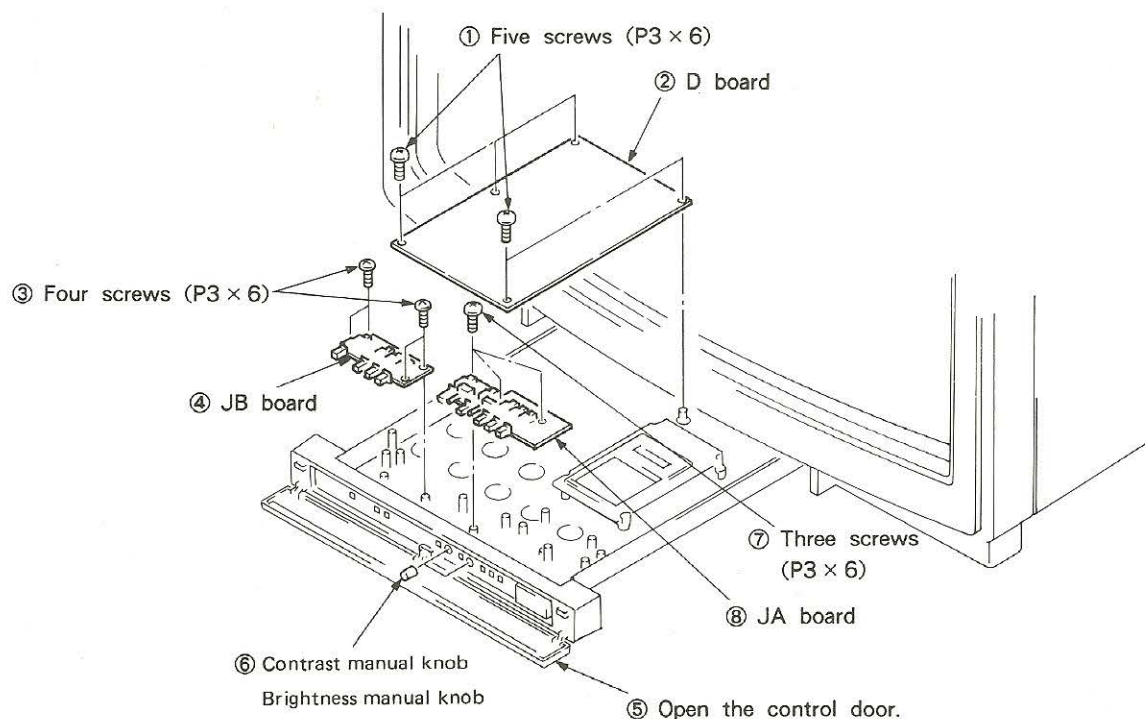


Be sure to short-circuit the anode of picture tube and the anode cap to ground after removing the anode cap.

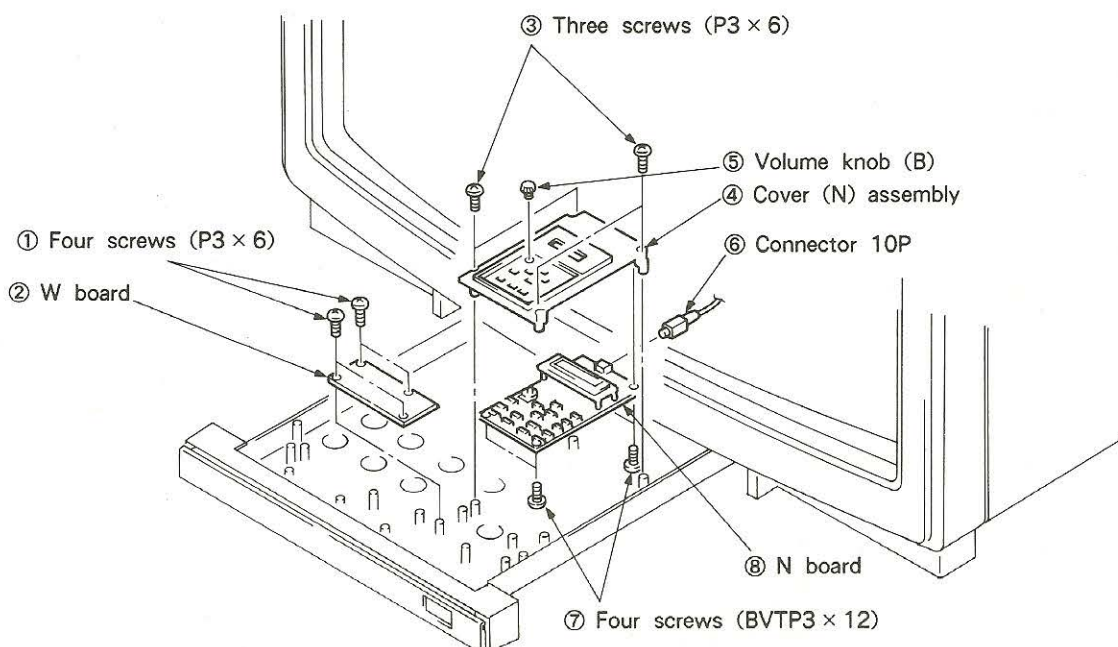
2-21. REMOVAL OF PC BOARD COVER (D) (SUB-CONTROL PANEL)



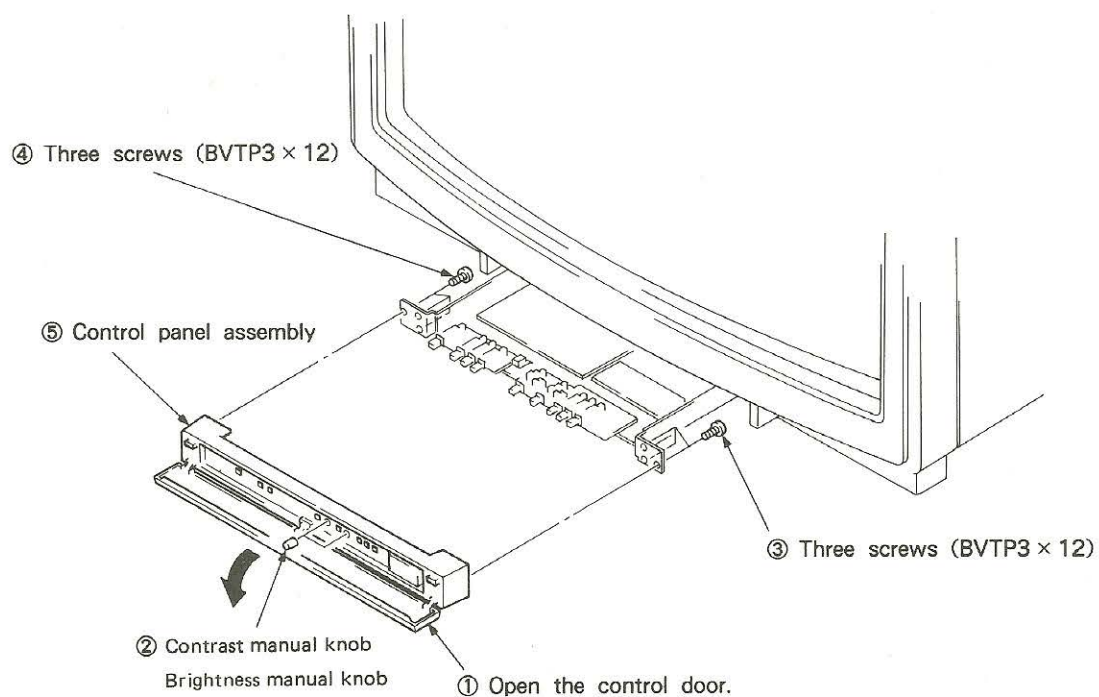
2-22. REMOVAL OF BOARDS D, JA AND JB



2-23. REMOVAL OF BOARDS N AND W



REMOVAL OF CONTROL PANEL 2-24. ASSEMBLY

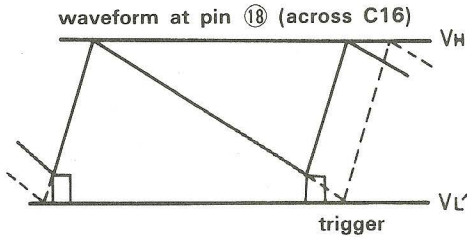


3. CIRCUIT DESCRIPTION

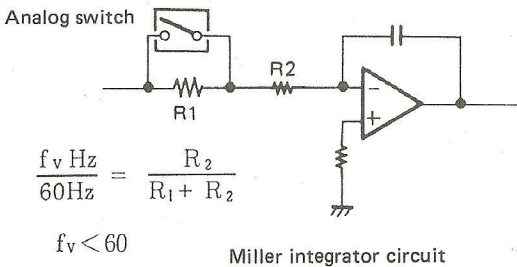
3-1

If SYNC signal is input while the C16 is discharging as shown in Figure, the Tr3 is put into conduction (ON), so that the C16 is started charging to obtain synchronization.

This output signal is amplified inside IC and becomes the positive polarity pulse at pin ②②. The pulse width of this signal is determined by the time constant of R34, C18 that are connected to pin ①③.



Furthermore, Q5 is turned on when a low \$f_v\$ is selected, lowering the free-run frequency of the vertical sync. On the Vertical Cycle Compensation Waveform There are many Miller integrator circuits (e.g. IC8, IC9 and IC10) inside the D board. If nothing is done to prevent it, their amplitude and phase would change when \$f_v\$ changes. Therefore, the input side resistance is set as shown in the figure, turning it on with the analog switch when frequency is 60 Hz and off when \$f_v\$ is low. In this way, the integrated output is kept constant.



VERTICAL DRIVE WAVEFORM GENERATING CIRCUIT (D BOARD)

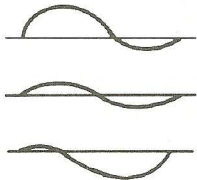
The operational amplifier IC7 (1/2) is used for sawtooth wave generation.

The C29, R63 form a Miller integrator circuit that generates sawtooth signal having good linearity. R63 is connected to a voltage determined by R60, RV5 and RV6. When frequency is 60 Hz, amplitude is determined by RV5. While at 60 Hz Q9 is on, at 50 Hz Q9 is off and RV6 operates. The Q10 works as a switch that resets this integrator by VD during retrace period. The sawtooth wave signal of $\pm 6V$ is provided at IC7-① pin. The IC7 is the polarity inverter and IC8 (1/2) is the similar Miller integrator that converts output into parabolic wave at ⑦-pin that is again passed through IC8 (2/2) integrator so that output signal becomes sinusoidal (sine) wave.

The vertical drive waveform is generated by mixing these sawtooth wave signal and the sinusoidal wave signal at IC9 (1/2). The vertical linearity correction can be adjusted by changing the sinusoidal wave amplitude gain with RV9.

The sawtooth wave from RV7 and the parabolic wave are mixed and input to IC8-② pin. Since RV7 can change the sawtooth wave vertical balance, the RV7 can consequently change the linearity correction balance at the top and bottom of picture at IC8-① pin as shown in Figure. The vertical drive waveform receives amplitude adjustment by RV10 and is output through a buffer amplifier IC9 (2/2).

Q13 is the picture size select switch to be used during set-up.



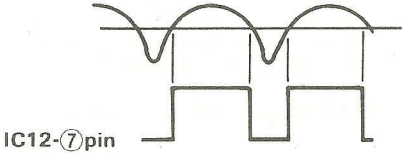
TOP AND BOTTOM PIN DISTORTION CORRECTION CIRCUIT (D BOARD)

The vertical drive voltage that is supplied from IC9-⑦ pin, is amplitude adjusted by RV18 and supplied to IC15-⑦ pin and is then routed to IC16-① pin.

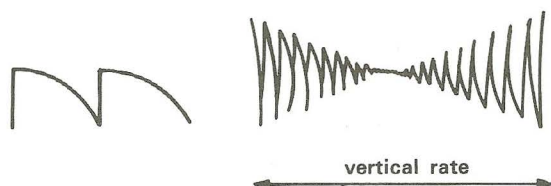
This signal is passed through two integrators of IC14 (1/2) and IC14 (2/2) that provides horizontal rate parabolic wave that is supplied to IC16-⑩ pin.

Q22, Q23 are reset switch where its timing is determined by IC12, IC13.

Since IC16 is a balanced modulator IC, signal is balanced-modulated by the pin ⑨ input signal. The output IC16-⑫ pin has therefore top and bottom pin correction waveform output as shown in figure. This output is sent through an emitter follower Q25. The horizontal parabola phase is determined by IC12 and IC13. The horizontal pulse from the horizontal deflection circuit is switched by Q19, and is integrated twice by L1, C41 to generate the parabolic wave. This waveform is passed through a comparator IC12 so that the reference pulse synchronized with the horizontal deflection is obtained at IC12-⑦ pin.



Using this reference pulse, a triangular wave is generated by Q20, R137, C63. This signal is input to comparator IC13-③ pin and output at IC13-⑦ pin. Dc voltage is supplied from RV17 to IC13-② pin so that the phase of this output pulse can now be changed by RV17. This output signal is routed to Q21 to be converted to the reset pulse of Q22, Q23.



LEFT AND RIGHT PIN CORRECTION WAVEFORM CIRCUIT (D BOARD)

IC10-① pin (1/2) receives the mixed signal of the sawtooth wave from IC7-⑦ pin, sinusoidal wave from IC8-① pin whose amplitude can be adjusted by RV54, and the dc voltage from RV12. After passing through the integrator IC10, the left and right pin correction waveform is obtained at IC10-⑦ pin.

In the HDTV system A, gain of this waveform is adjusted by R113 and RV14, then it is output via the buffer amplifier IC11. The horizontal picture size control voltage is selected by RV15, then it passes through IC28 and the voltage follower IC11 before being output.

BLANKING WAVEFORM GENERATING CIRCUIT (D BOARD)

The horizontal cycle blanking pulse is generated by shaping the horizontal pulse with Q26 and Q28, then sending it out through Q109 and Q110. On the other hand, the vertical cycle blanking signal is input to Q27, then it undergoes AND gating with Q26 and it is output to the CA board as a composite blanking signal. In the HDTV system B, a variable blanking pulse is added by Q114.

This pulse is generated as follows.

The pulse from the horizontal deflection circuit is input to Q115, the pulse from Q115 is input to the double integration circuit composed of L7 and C223 and converted into a parabola wave. The phase of this wave is changed by RV76. It passes through C224, then it is input to ③-pin of the comparator IC31 and a pulse corresponding to the voltage at ②-pin is output from IC31-⑦ pin. This pulse is added as the above-mentioned composite blanking signal, assuming a wide H size signal, e.c. (provisional MUSE specifications).

DESCRIPTION OF CONVERGENCE CORRECTION SYSTEM

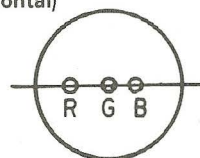
Prior to the circuit description, the convergence correction method is first described as follows.

BEAM ALIGNMENT ADJUSTMENT

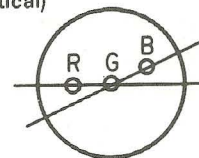
The TRINITRON employs the in-line type guns. There is possibility that the RGB beams will not go through the deflection center because of the non-uniformity in gun assembling process, or the tolerance when guns are sealed into neck. As the result, the side beams become nonsymmetrical with regard to the center beam, so that the convergence becomes difficult.

To cope with this problem, this equipment uses six pole magnet to be used for beam alignment correction. The actual alignment procedure is provided in the Alignment section.

beam nonsymmetrical (horizontal)



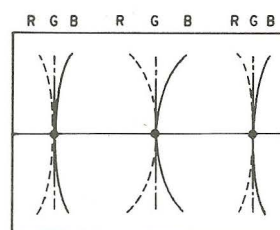
beam nonsymmetrical (vertical)



TRANSVERSAL CONVERGENCY CORRECTION

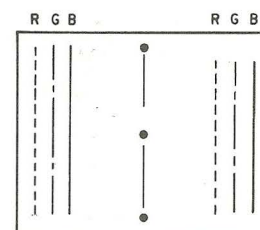
The super fine pitch TRINITRON convergence system outline is simply described as follows. The DY (deflection yoke) used in this system has an uniform magnetic field in order to avoid CRT beam spot distortion.

The CRT focus is therefore superior, but transversal convergence error as shown in Figure can happen.



Y-axis direction transversal convergence error

(When the X-axis transversal convergence error is corrected.)



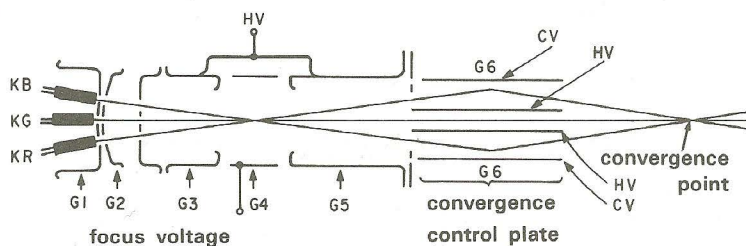
X-axis direction transversal convergence error

(When the Y-axis transversal convergence error is corrected.)

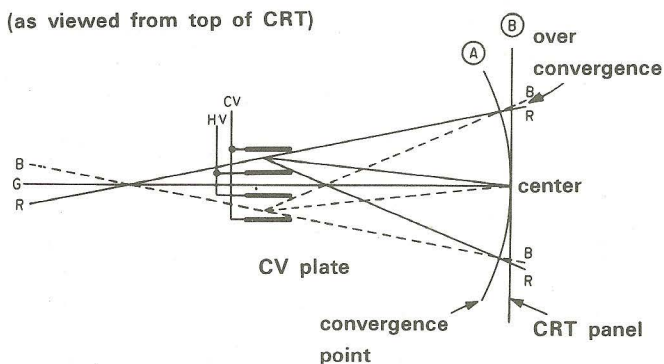
ELECTRO-STATIC CONVERGENCE

One of unique feature of the TRINITRON is the electro-static convergence that is described as follows. The Figure shows the gun structure. The G6 is the convergence control plate (CP) that is receiving the convergence voltage (CV $0.97 \times HV$) from high tension supply (HV) through a high tension resistor (HVR). Since the center beam (green) receives no electric field strength, the center beam is not bent but runs straight. However, the side beams (red and blue) are bent by the electric field produced by the G6 convergence control plates.

Controlling this CV voltage moves the convergence point. The electro-static system therefore is capable of convergence correction. The widely used convergence correction system employs an electro-magnetic coil, which deforms the beam shape and gives adverse effect on focus. But this electro-static system, using the CV electrode does not have such disadvantages but provides good focussing characteristics.

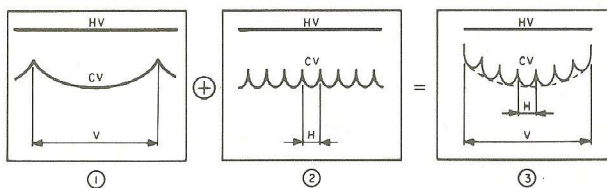


(as viewed from top of CRT)

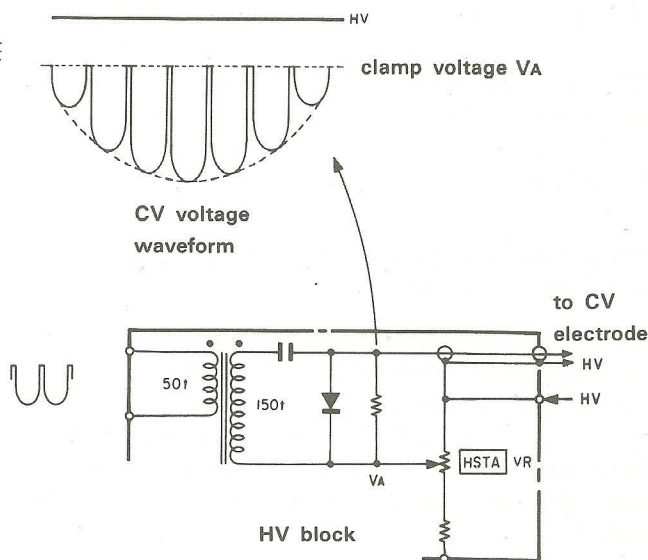


Turning back to the X-axis direction convergence error problem, the reason why the X-axis direction convergence error is generated, is described as follows. The Figure shows that the point (A) is the R, G, B, convergence point when the dc convergence voltage is applied to the CV electrodes, indicating that the convergence points become cylindrical shape. However, the CRT front panel (B) has nearly flat shape rather than cylindrical shape. It results that the both sides of the CRT front panel have excessive correction of convergence. This is the reason of the X-axis direction convergence error. The Y-axis direction transversal convergence error is, in the same manner as the X-axis convergence error, able to be corrected by applying the correction voltage to the CV electrodes as shown in Figure.

The above two convergence correction signals are mixed so that the mixed waveform as shown in Figure is the needed convergence correction waveform.

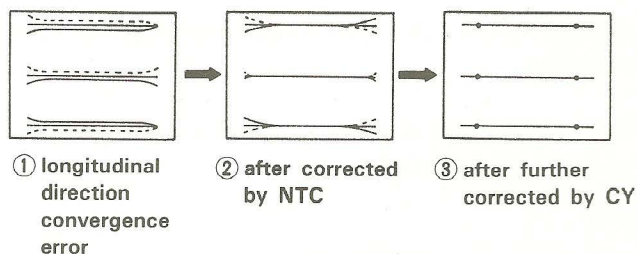


Now, since the CV electrode is receiving the very high voltage (≈ 30.6 kV), the DCT (Dynamic Convergence Transformers) is used to transmit the convergence correction waveform in order to get insulation. Since the vertical rate voltage is impossible to transmit by use of transformer, chain of pulse are inserted during the retrace period of horizontal deflection. These pulses are peak-clamped by the diode peak clamp circuit in the DCT secondary circuit so that the correction voltage is transmitted. The Y-axis direction transversal convergence error can be corrected by changing the amplitude of these pulses.



LONGITUDINAL CONVEGENCE CORRECTION

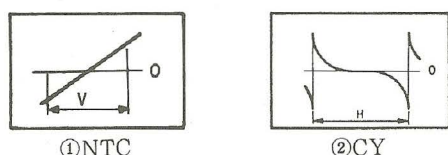
The longitudinal-direction convergence error does not exist from the principle because the gun structure is designed as in-line. However, due to the non-uniformity in assembling the CRT and DY, and also due to the earth magnetism effect, very small amount of the longitudinal convergence error is taking place.



The longitudinal convergence error is corrected by two methods.

1. The longitudinal convergence error along with the Y-axis (dc components) is corrected by NTC (Neck Twist Coil) as shown in Figure ② while, 2. The longitudinal convergence error in both sides (ac components) is corrected by the CY (Convergence Yoke), as shown in Figure ③.

The correction waveforms needed to carry out the convergence error correction as shown in Figure ②, ③, are the NTC and CY correction waveforms as shown in Figure ①, ②.



There are two CYs in HDM-3830/3830E. One of them performs the previously mentioned operation, but since a high-frequency current is sent through it (the CY is an inductance) and the blanking period is short ($3.77 \mu s$), the correction waveform is delayed, and the left side cannot be properly corrected. Therefore, a sub-CY is used for complementary correction.

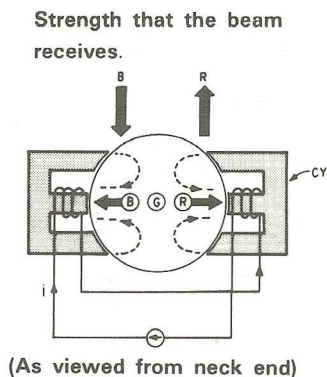
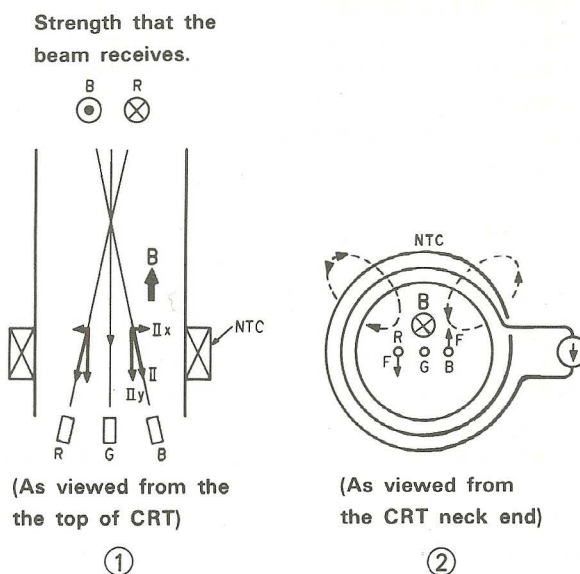


Figure shows the CY (Convergence Yoke), as viewed from the neck side. As the CY (Convergence Yoke) is generating the magnetic fluxes, it provides the physical strength toward beams as shown in Figure. The strength on the side beams area (B and R) are, as shown in Figure, generated in opposite directions each other by the CY synthesized magnetic fluxes. The one direction of strength is to raise the one beam upward direction, while the another direction is lowering the another beam downward direction.

The center beam receives no strength from the CY's magnetic fluxes because the magnetic fluxes are cancelled to zero in the center beam area. The red and blue beams move in the vertical directions symmetrically against the green beam in the center.



The longitudinal convergence correction along with the Y-axis is carried out by the NTC (Neck Twist Coil). The NTC (Neck Twist Coil) has the coil winding as shown by the dotted line in Fig ②. The NTC produces the magnetic flux as shown B in the same Fig ①. Since the magnetic flux B is in parallel with the center beam, the center beam receives no strength, and does not move at all. The side beams' currents I and II receive strength in two directions of the I_x direction and the I_y direction as vector analyzed in Fig ②. Only the I_x component alone receives strength from the NTC magnetic flux and is bent. Therefore, the red and the blue beams are shifted upwards and downwards symmetrically against the green beam by the NTC coil's magnetic flux change. This is the description of the convergence correction system. Following is the circuit description.

MODULATION WAVEFORM GENERATING CIRCUIT (D BOARD)

The convergence correction waveform is made by adding the analog correction signal and the digital correction signal.

The analog correction system provides the fifteen convergence adjusting points on the monitor screen. These are three adjusting points in the horizontal direction and five adjusting points in the vertical direction. The convergence adjusting controls (variable resistors) correspond to the adjusting points on the monitor screen. The three horizontal convergence adjusting points are provided at five of each vertical convergence adjusting points i.e. total fifteen convergence adjusting controls are provided. Since the picture screen is divided into five blocks vertically for the convergence correction as shown in Figure the five different modulation waves as shown in Figure are prepared for vertical convergence correction.

Fig. a signal is to be used for top of picture correction, Fig. b is to be used for top-center of picture correction,

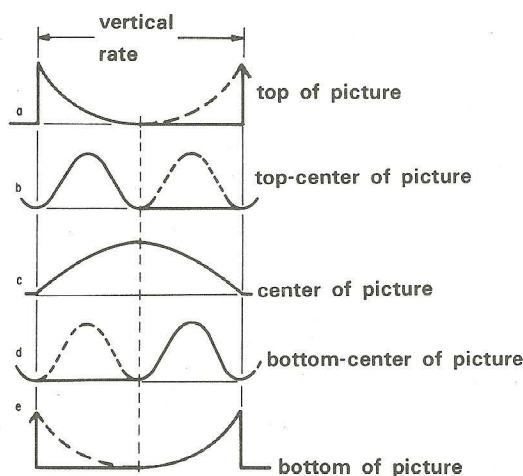
Fig. c is to be used for center of picture correction, Fig. d is to be used for bottom-center of picture correction, and Fig. e is to be used for bottom of picture correction. These waveforms are generated principally from the vertical rate parabola waveform and the half-of-vertical rate sinusoidal (sine) waveform, after they are divided.

1) V. parabola

The vertical rate parabola that is obtained from IC8- 7 pin is clamped to ground potential by the clamper circuit of Q49, Q50, and is output.

2) V/2 sine generator

The vertical rate square wave from IC18(2/2) is differentiated and shaped by Q34. Then the pulse that is 180 degrees phase apart from the vertical drive pulse (VD), is obtained. This pulse and the VD are added and are applied to the Miller integrator of IC15(2/2) as its reset pulse. Then half-of-vertical rate sawtooth wave (V/2 sawtooth wave) is obtained from the Miller integrator IC15- 1 pin output. This output is then again integrated by another Miller integrator IC19(1/2). Then the parabola waveform is obtained. The output parabola waveform is converted into sinusoidal (sine) wave by the active filter of Q40, Q43, is clamped to the ground potential by the clamper Q44, Q45, and is output. Accordingly the repetition rate of this sinusoidal wave becomes half of the vertical rate.



The above described three voltage waveforms are polarity inverted respectively by IC20 (2/2), IC20 (1/2) and IC 19 (2/2) so that polarity-inverted voltage-waveforms are obtained respectively. The IC18 (2/2) is the zero-cross detector. If a sawtooth wave having its average level equal to ground level, is input to this zero-cross detector, the zero-cross detector outputs a 50% duty cycle square wave. This output voltage drives the analog switchers of IC23 (2/3), (3/3), and IC24 (2/3), and (3/3) respectively.

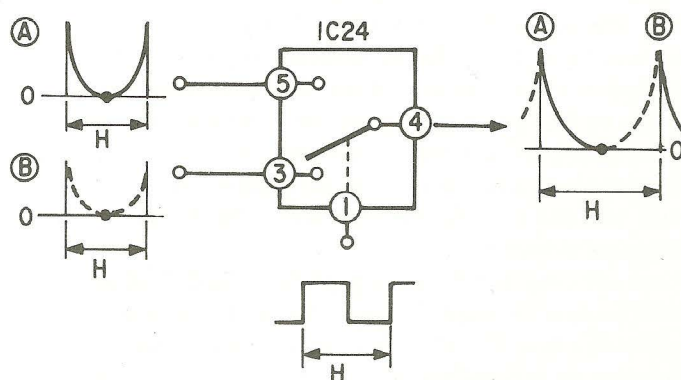
These analog switchers switch the input voltage waveforms (vertical parabola and half-of-vertical rate sine wave) in vertical rate in time domain.

HORIZONTAL DIRECTION CONVERGENCE CORRECTION CIRCUIT (D BOARD)

Convergence of the left part of picture, is corrected as follows. The IC26- ⑦ pin signal that is synthesized by RV37 thru RV41, is switched by the horizontal rate pulse from the horizontal deflection at Q69. This output is converted into parabola waveform by the two times integration by L5, C139. This parabola output is amplified by Q70 and is zero-clamped by IC26 in the center of horizontal trace of picture. The clamp pulse is supplied from Q33. The clamped parabola signal is supplied from Q71 to IC24 (1/3)- ③ pin. This is the convergence correction signal for the left part of picture. The convergence correction signal for the right part of picture is generated in the same manner. The convergence correction signal synthesized from RV47 thru RV51, passes through the equivalent circuit by IC27 in order to make up the correction signal for right part of picture, and is then supplied to the analog switcher, of IC24 (1/3)- ③ pin. Since this analog switcher is receiving the horizontal rate control voltage input to its control pin of IC24- ① pin, the correction waveform is switched during the former half and latter half of horizontal trace i.e. the right half and left half of horizontal scan of a picture are receiving different convergence correction waveform respectively.

This correction waveform output is supplied through R387 into Q66. Since Q66 is receiving also the digital correction signal through R406, Q66 provides the addition of analog and digital correction waveforms. This is the correction signal for the right side of picture. The convergence correction signal for the center of picture is obtained from RV42 thru RV46 and is output from IC25- ⑦ pin. This signal is passed through R377, R380 and is input to Q65. The digital correction signal is at the same time provided through R374, and added to the analog correction signal so that the digital and analog correction signals are added and input to Q66. This output signal is converted into a chain of pulse signal as Q31 pulse is input to D15.

Accordingly, the horizontal convergence correction signal from Q68 is the voltage waveform that is the addition of Q65, Q66 and is output from Q68.



VERTICAL DIRECTION CONVERGENCE CORRECTION CIRCUIT (D BOARD)

The vertical direction convergence correction circuit, in the same manner as the horizontal direction convergence correction circuit, picks up the waveforms from RV22 through RV26 and RV32 through RV36. These waveforms are clamped to the zero potential in the center of horizontal scan. The left half and the right half of scan have the different waveforms as switched by IC23(1/3), and are buffered by emitter followers Q59, Q60, and are output. The digital correction waveform is supplied through R301 and is added to the analog correction waveform at Q59. The vertical direction convergence correction for the center of scan is mixed by RV27 through RV31 and amplified by IC25(1/2), Q63, Q64 current amplifier, and drive the NTC. The digital correction waveform is added through R347, at IC25. Furthermore, the waveform from the circuit including RV22 to RV26 (which incorporates an auxiliary circuit to make up for insufficient correction of the left side) is converted into a pulse train by Q51, it passes through IC32 and the amplifier composed of Q117 and Q118, then it is output to the E board. This becomes the sub-CY correction waveform.

VERTICAL DEFLECTION OUTPUT CIRCUIT (E BOARD)

The vertical deflection sawtooth wave and the top/bottom of scan pin-cushion correction waveforms are input the the differential amplifier Q9, buffered by Q12, amplified by Q10, Q11, Q13, Q14 the SEPP complementary amplifiers, and drive the vertical deflection yoke. The top/bottom of scan pin-cushion correction transform T3 (VPT), that is connected to the output terminal of the vertical deflection transformer, picks up only the horizontal rate top/bottom pin-cushion correction waveform, steps up this waveform, and modulates the deflection yoke current by its secondary winding. The R45, R46, R47, that are connected to T3, are the damping resistors for T3 and the vertical deflection yoke, that improves the deflection at the top of picture. The resistor R49, that is connected to the bottom of VPT's secondary winding, detects the deflection; yoke current, and applies negative feedback (NFB), in order to improve the deflection waveform. The thyristor D15 is turned ON, as it receives the vertical deflection yoke's fly-back pulse during the vertical retrace period through R41, C12 to its gate, so that the deflection current linearity is improved by introducing the high tension voltage during the retrace period. The inductance L7 in the D15 anode circuit converts the sharp current change in the thyristor ON transient, into the resonant current by L7, C20 so the thyristor D15 will surely turned OFF when the thyristor triggering current becomes lower than its keep current.

HORIZONTAL DEFLECTION OUTPUT CIRCUIT (E BOARD)

The left, right sides' pin-cushion correction is performed by modulating the power supply voltage of the horizontal deflection circuit. This pin-cushion correction is executed by the circuit of IC1, Q1, Q2, Q3. Q2 is the output transistor while IC1 is the error amplifier. The left/right pin-cushion correction waveform from D board and the picture size determining dc voltages are introduced to IC1 ⑤ pin. The IC1 ⑥ pin is the detect voltage by R9 through R11.

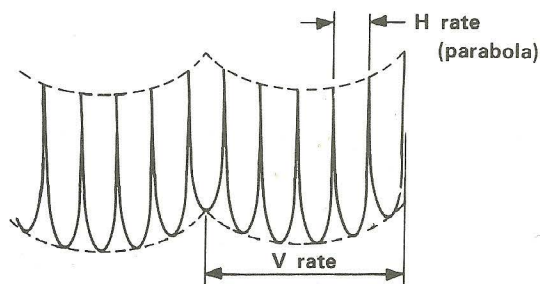
The horizontal drive pulse from the D board is introduced to Q4 that drives the horizontal drive transformer T1 (HDT). The horizontal drive transformer T1's secondary circuit is connected to the horizontal deflection output transistor Q5 through R17 and the speed-up diode D3 that is switching Q5. The Q5 collector circuit is connected to the horizontal deflection yoke, the resonance capacitor C10, C98 and C100 and the damper diodes D4, D60 and D61. The Q5 collector circuit is also connected to the left, right pin-cushion correction power supply that is fed from the horizontal output transformer T3 (HOT). One of the secondary windings of the horizontal output transformer T2 (HOT) generates the horizontal position adjustment power at D6 and D7, and performs horizontal position adjustment by means of Q6 and Q7. The other secondary winding is a pulse winding used for dynamic focus. The signal it generates is converted into a parabola wave at the circuit composed of L3 and C90, then sent into the T4 DFT. The horizontal deflection current that flows through the horizontal deflection yoke, also flows through the horizontal linearity coil L2 (HLC) and the S-shape distortion correction capacitor C16. Since the linearity coil L2 (HLC)'s inductance changes in accordance with the amount of current flowing, the left, right sides of picture linearity is improved. The capacitor C16 and C107 corrects the linearity difference between the center of picture and both sides of picture.

DYNAMIC FOCUSING CIRCUIT (E BOARD)

The transformer T2 (HOT) provides the horizontal pulse output voltage that is integrated by L3, C90, and is again integrated by the primary winding of the dynamic focus transformer T4 (DFT), so that the secondary winding generated approximately 800 Vp-p parabolic voltage. The transistor Q34 amplifies the IC10 ④m7E pin (D board) output vertical rate parabolic voltage up to approximately 250 Vp-p.

Since T4's secondary winding is connected to the Q34 output circuit, the another end of the T4's secondary winding supplies the dynamic focus waveform that is the addition of the horizontal rate parabola signal and the vertical rate parabola signal. This dynamic focus signal is fed to E-6, to the K board, to the capacitor C1, and then to the FOCUS adjusting variable resistor so that the focus voltage is modulated.

The AFC pulse is rectified by D18, C28 that generates approximately -300V power that is supplied to Q34.



VERTICAL DIRECTION CONVERGENCE OUTPUT CIRCUIT (E BOARD)

The vertical-direction convergence correction waveform from the D board passes through the power amplifier circuit composed of IC8, Q44, Q45, Q46 and Q47, then it is sent into the CY. On the other hand, the auxiliary vertical-direction convergence correction waveform passes through the power amplifier composed of Q22, Q23 and Q25 to Q28, then it is sent into the sub-CY.

HORIZONTAL DIRECTION CONVERGENCE OUTPUT CIRCUIT (E BOARD)

The horizontal-direction convergence correction waveform from the D board passes through the voltage amplifier circuit composed of Q16 to Q21, then it is sent into the DCT transformer.

"EHT" REGULATOR CIRCUIT (E BOARD)

The horizontal drive pulse, that is supplied from the terminal E3, is amplified by Q29, Q30, coupled by T5 (CDT), and drives the high voltage output amplifier Q31. This transistor Q31's collector has C47, D29, T6 (LOT), and (after passing through the K board) the fly-back transformer (FBT). This circuit operates in exactly same manner as the horizontal output circuit.

The +B power is supplied through T6. The FBT is the multi-singular type transformer, having six rectifying diodes in the secondary circuit. The second tap of the FBT supplies the focus voltage.

The highest voltage of the FBT is the high tension output that is routed through the HV block, and to the CRT anode. The high tension output is, at the same time, divided into 1/3570 voltage by the high tension resistor network, and is supplied to the connectors E17 ③ pin and to E17 ⑤ pin. The 1/3570 divided high tension voltage, appearing at the connector E17 ③ pin is used as the high tension's error voltage detection signal which is passed through the buffer IC3(2/2), and to the error amplifier IC3(1/2) where the high tension's error voltage is compared with the reference voltage (VRV=8.95V). The comparison output is amplified and drives the differential amplifier IC4 ⑤ pin.

Since the IC2 ⑦ pin is connected to the IC4 ③ pin, the IC4 ① pin repeats the on, off operation that charges the C62, that is

forming the sawtooth generator. The IC4(1/2) is the pulse width modulation (PWM) circuit. The pulses that is generated at the IC4 ⑦ pin is buffered by Q32, and then gates D57. This circuit thus enables to control the back pulse's energy generating at anode of Q57, that is namely controlling the energy to the FBT. This is the "EHT" regulator circuit operation.

This EHT regulator is generating, at the same time, the various outputs such as $\pm 22\text{V}$ output (used for vertical output circuit), $+30\text{V}$ (used for CY drive) from T6 (LOT), 6.3V (for heater), -120V (used for G1 bias), etc.

HIGH VOLTAGE HOLD-DOWN CIRCUIT (E BOARD)

The feed-back voltage that is supplied from the HV block, appearing at the terminal E-17 ⑤ pin is normally 8.95V . This signal is input to the comparator IC5(2/2) ⑤ pin so that it is compared with the another input voltage at IC5 ⑥ pin input. The voltage value of the VHV signal is determined by R140, R141 so it will be $9.45\text{V} \pm 0.05\text{V}$. Therefore, IC5(2/2) ⑦ pin output is normally "LOW". However, if the high voltage should increase abnormally by some accident until the IC(2/2) ⑤ pin + input voltage exceeds the VHV voltage, the IC5(2/2) ⑦ pin output becomes "HIGH", that turns on the thyristor D45. Since the D45 anode is connected to the high voltage convertor drive IC2, the high voltage is held-down as the D45 is turned on to remove the high voltage drive pulse.

The high tension voltage value is calculated by the following equation to start the hold-down operation.

$$\text{HV (PRT)} = 9.45 (\pm 0.05\%) \times 3570 \left(\begin{smallmatrix} +3\% \\ -1\% \end{smallmatrix} \right) = 33.7 \begin{smallmatrix} +1.2 \\ -0.5 \end{smallmatrix} \text{ kV}$$

BEAM PROTECTOR CIRCUIT (E BOARD)

If the CRT anode current should increase abnormally by some accident, This beam protector circuit stops the generation of the high voltage which is a kind of the ABL circuit. This equipment has two beam protectors.

The anode current detection method is through the use of detector resistor that detects the FBT's secondary current (which is the addition of the CRT current + high tension resistor's current + focus resistor current). The detected signal is in the form of voltage signal. The detector resistors are R134, R135, R136, R182. As the ABL current flows, the connector E-17 ⑦ pin voltage is decreased. Since the current flowing through the high tension resistor and focus resistor, which is the bleeder current, is constant, the abnormal increase of CRT current decreases the IC5(1/2) ③ pin + input voltage lower than its ② pin - input voltage (VRV). Therefore the IC5 output becomes LOW. Since the IC2(2/2) forms a hysteresis comparator, its output is kept LOW which stops the high tension comparator drive IC2(2/2) through D43. This is the beam protector-1 operation.

The D44 cathode is connected to the terminal E-17 ⑦ pin (ABL) at the same time. If the beam protector-1 should not start

operating by some accident, the D44 conducts in turn, that decreases the IC6(2/2) ⑤ pin input voltage. As the IC6(2/2) ⑤ pin + input voltage becomes lower than its ⑥ pin - input voltage, its IC6 ⑦ pin output becomes "HIGH" to "LOW", that drives the diode D54 into conduction. Therefore, the IC2 output is cut-off to stop generation of the high voltage. This is the beam protector-2 operation.

CRT (CATHODE RAY TUBE) PROTECTOR CIRCUIT (E BOARD)

If the deflection circuit should fail to operate and should stop to scan, it will result in burning of front phosphor plate of the CRT. In order to avoid the phosphor burning, the high tension circuit operation is stopped as soon as the horizontal deflection output or the vertical deflection output is stopped its operation. The horizontal and the vertical deflection output is detected as follows.

The horizontal deflection circuit T2 (HOT)'s secondary pulse is rectified and smoothed out by D46, C76 to be converted into the dc voltage that is supplied to the IC6(2/2) ⑤ pin. Since the IC6 ⑥ pin is receiving dc 6V from the D48, stoppage of the horizontal deflection decreases the ⑤ pin voltage lower than the ⑥ pin voltage so that the IC6 ⑦ pin output is set "LOW" that stops the high tension drive operation through D54.

The vertical deflection circuit has the same operation. The vertical deflection output pulse is converted into dc voltage by D50, C80 that is connected to IC6 ③ pin. If the vertical deflection should stop, the ③ pin voltage becomes lower than ② pin voltage so that the output IC6 ① pin becomes "LOW" that stops the high tension.

The C78, R170 are used for prevention of erroneous operation of this protector circuit when the power switch is turned on.

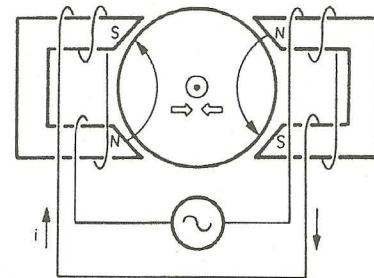
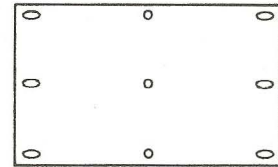
QUAD POLE (U BOARD)

Dots displayed on the right and left edges of the CRT screen tend to appear oval, as shown in the figure, even if focus is correct. This is because the beam does not hit the fluorescent surface at a straight angle in those areas. In order to make these dots closer to perfect circles, a corrector quad pole has been included in G4, where RGB beams cross.

The figure shows the quad pole as seen from the neck side (RGB beams converge in one point). The magnetic fluxes generated at the quad pole are like illustrated. In the beam center, both magnetic fluxes cancel each other. In both sides of the beam, however, they are active in the vertical direction, and a force that pushes electrons toward the center of the beam (according to Fleming's left-hand rule) makes the beam vertically elongated. When the H-cycle parabola current synchronized to the horizontal deflection (current at the center of the parabola is

zero) is applied, modulation makes dots at both sides closer to perfect circles, not affecting the center.

This correction waveform is generated at the U board.



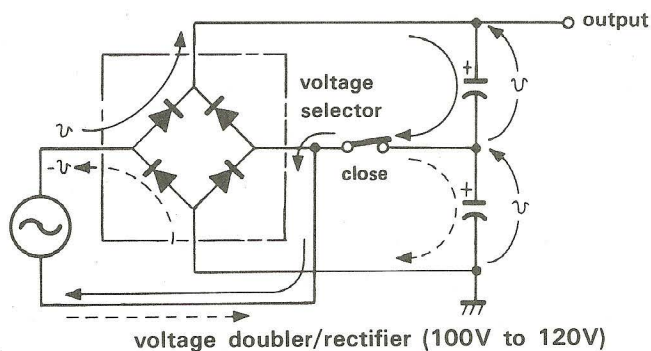
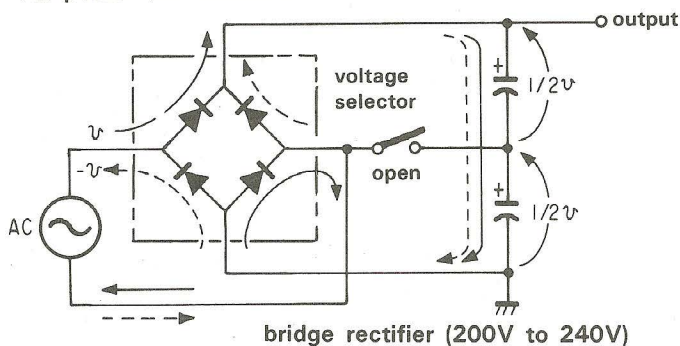
LINE FILTER CIRCUIT (F BOARD)

The line filter is made from the F board T1, T2, C1, and C3 thru C6. The input circuit of this filter is connected to the AC INLET (CNP901).

AC POWER LINE VOLTAGE SELECTION (F BOARD)

The ac power line voltage selection is made by the voltage selector (S902). Either the voltage doubler rectifier or the full wave rectifier is at the same time selected by the voltage selector. AC100V to AC120V or AC220V to AC240V input line voltage can be used by selecting the proper position of the voltage selector.

Ac power line selection



DEGAUSSING CIRCUIT (F BOARD)

The degaussing coil is used when CRT is going to be demagnetized. The demagnetization is done by the degaussing

coil (L901) that has the posistors connected in series. The ac alternating damping curring is flown through the degaussing coil for demagnetization. The relay (RY-1) in the F board and the transistors Q1, Q2 in the GA circuit board flow the degaussing current automatically during the initial few seconds after POWER switch is turned on. When the front panel degauss button is pressed, the current also flows in the same manner. The posistors are selected for ac 100V-120V use (5 ohms) or ac 220V-240V use (30 ohms) by the voltage selector operation.

EXCESSIVE AC INPUT VOLTAGE PROTECTION CIRCUIT (F BOARD)

If the excessive input voltage is applied to the ac power input line, or if the voltage selector's setting is erroneously made and the power switch is turned on by mistake, the protection circuit of D1 etc., in the GA board starts operating to blow the ac fuse (F901). The circuit is designed to start operating when the ac input voltage of approximately 14% or higher voltage than the specified voltage that is rated by the voltage selector is input.

±12V POWER SUPPLY (GA BOARD)

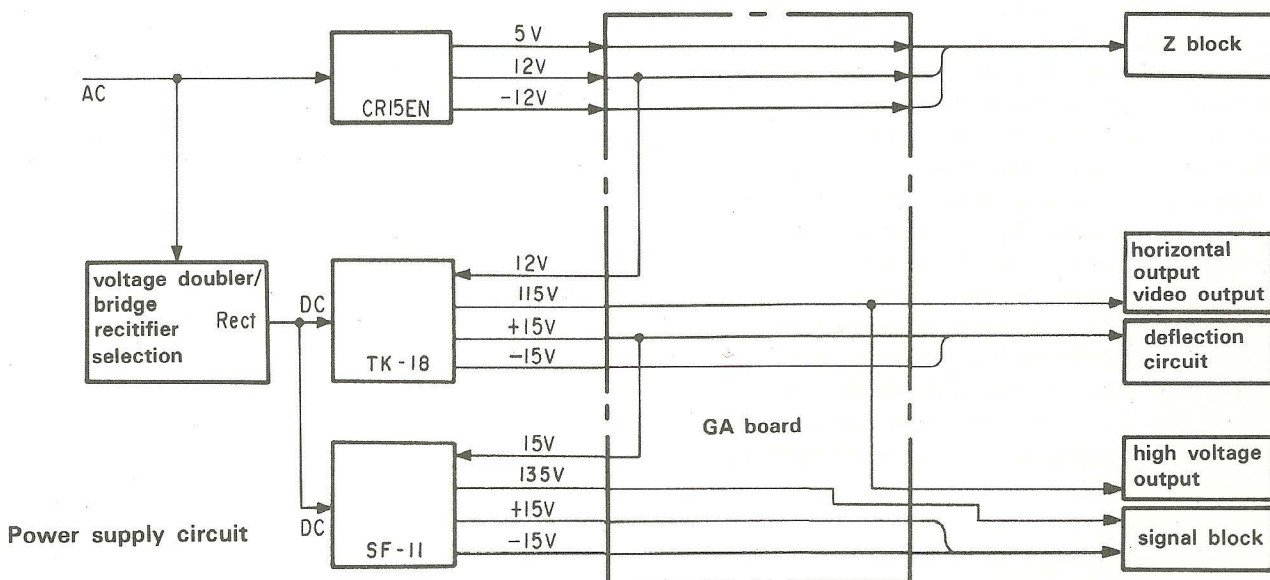
The ±12V power is supplied from the three terminal regulator IC1, IC2, IC3, IC4, and distributed to each circuit boards.

POWER SUPPLY

This power supply has the three types of switching power supplies (CR15EN, SF11, and TK18).

The AC input voltage is directly input to CR15EN. The DC voltage that is rectified by the D2 of the F board is input to SF-11 and TK18.

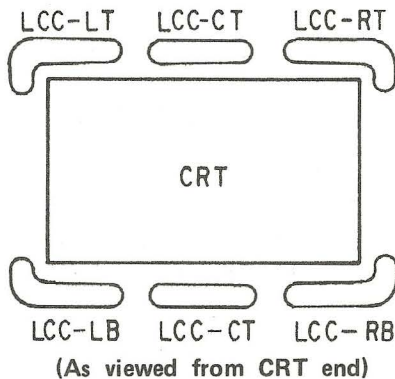
When the power switch is turned on, the CR15EN starts to output 5V and ±12V. This 12V becomes the starting power supply for the TK-18 that generates 115V and ±15V. This 15V becomes also the starting power supply for SF-11 that generates 135V and ±15V. These voltages are distributed to each circuit board at the GA board.



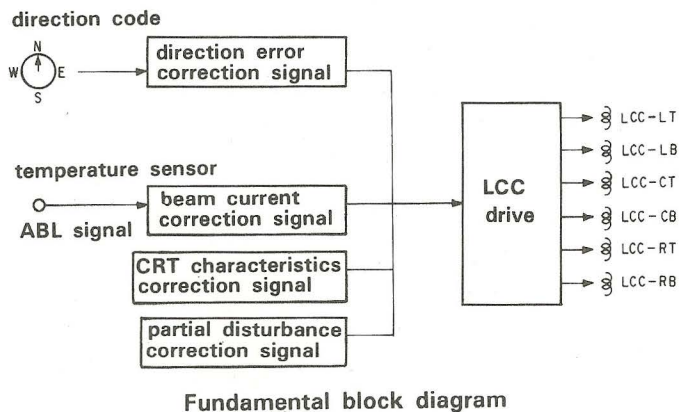
BEAM LANDING CORRECTION CIRCUIT (R.W BOARD)

This monitor is equipped with the six pieces of the beam landing correction coils (LCC=Landing Correction Coil) around the circumference of the CRT. The optimum beam landing is maintained by flowing the appropriate correction current. This beam landing correction is applied to the following points.

1. Landing correction that is generated by the direction of monitor installation (horizontal earth's magnetism).
Note: This circuit does not correct for the vertical earth's magnetism. It is corrected by the purity magnets inside.)
2. Correction for the landing change due to change of beam current in average.
3. Correction for the landing change due to specific CRT's landing characteristics.
4. Correction for the landing change due to partial disturbance of the ambient magnetic field.



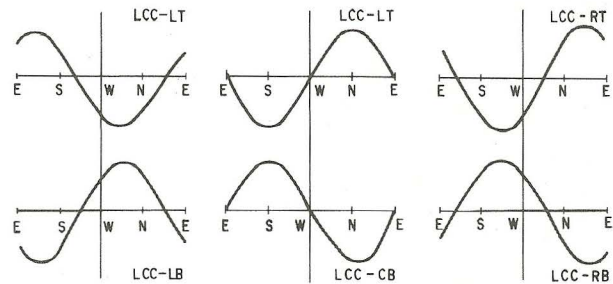
Fundamental correction circuit of the landing correction system is shown as follows. Explanation is discussed block by block.



Direction Correction Signal

As the monitor is installed, it receives the effect of earth's magnetism. The effect of the earth's magnetism is different depending on the direction of the monitor installed. The beam

landing receives its effect and the landing change due to the earth's magnetism change corrected by determining the polarities of the six pieces of the LCCs respectively. Flowing the six different ac sinusoidal electric currents through the six LCCs respectively as shown in Figure. 3, can correct the beam landing error due to the earth's magnetism.



Direction correction current for LCC

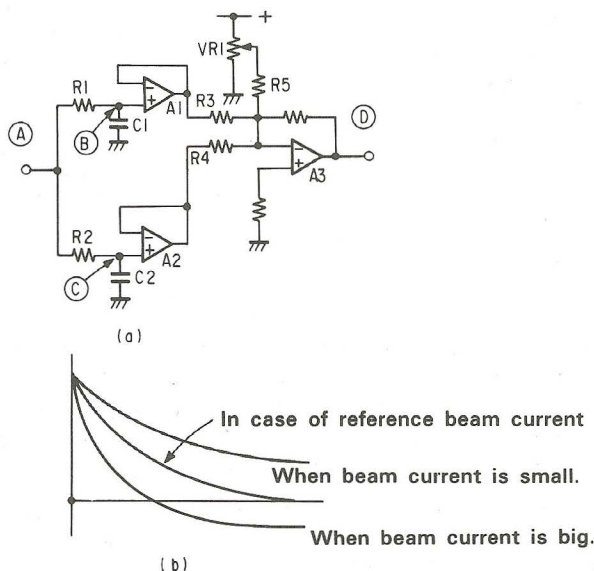
This system has the digital memory that memorizes the direction data for every 1/16th direction. These digital data are memorized in IC3 memory as shown in Figure. 4 and are supplied to the coils of LCC-LT and LCC-RB only. The switch S1 in the W board provides the 4 bit direction data that corresponds to the ROM addresses A0 through A3. The least address A4 receives 0 and 1 output alternatingly at vertical rate, which is supplied from IC2 ⑦ pin. Thus the landing correction data are obtained from ROM and determined by S1, and are supplied to the dual D/A convertors of IC4 where data are latched. These are dual data for LCC-LT and for LCC-RB. These two digital data are fed to the IC4 dual D/A convertor alternatingly at vertical rate. The analog converted data are then buffered and output to the LCC driver circuit as the landing correction signal. The LCC-LB and LCC-RT correction signals are obtained by reversing the LCC-LT and LCC-RB signal with IC5(2/2) and IC6(2/2).

Amplitude of these waveforms can be adjusted by shifting the D/A convertor's reference voltage with RV1, depending upon the strength of earth's magnetic field effect. The LCC-CB correction signal is obtained by adding both the LCC-LB and LCC-RT correction signals by IC7(1/2). The added output is further inverted to produce the LCC-CT correction signal. Amplitude of these signal waveforms can be adjusted by RV2, and adjusted depending upon the strength of horizontal earth's magnetic field effect.

Direction	Address					Data
	A4	A3	A2	A1	A0	
North	0	0	0	0	0	LT0
	0	0	0	0	1	RB0
North/North/East	0	0	0	0	0	LT1
	0	0	0	1	1	RB1
Northeast	0	0	1	0	0	LT2
	0	0	1	0	1	RB2
⋮	⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮

Beam Current Correction

If the average beam current changes, the CRT's internal mechanical components are affected by average beam current change so that the CRT's internal mechanical components are thermally deformed. Therefore, the beam landing characteristics is also affected. The correction signal for the thermal change is generated by the use of the RC's integral characteristics, as shown in Figure.



The Figure. point (A) is receiving the input voltage that corresponds to the average beam current. This input voltage is produced by the IC11, using the E board's ABL signal. The point (B) and the point (C) have the integrated output voltage that are fed to the voltage followers of A1 and A2. These output are inverted and added to make the output at point (D). The R1, C1 in Figure. provide longer time constant while the R2, C2 provide shorter time constant. The longer time constant produces the slower curve as shown in Figure. while the shorter time constant produces the sharper curve. These two curves are mixture to provide the output correction signal. The adjustment VR1 is the level-shift that is adjusted so that the correction output becomes 0 when the average beam current is present. The output at point (D) is further attenuated by other resistors so that the optimum correction amounts are provided for respective corners, and then applied to respective LCC drive circuits.

The practical circuits have the two types of pre-determined typical curve of landing drift so that the most closest curve is selected and applied to respective corners.

CRT Characteristics Correction Signal

Each CRT is placed in the standard ambient temperature, flowing the reference beam current, and waits until the CRT operation is stabilized. The beam landing correction is performed under this condition by adjusting the W board's six adjustments from RV7 through RV12. These six adjustments correspond to the respective LCCs. The output of these adjustments are the landing correction signals for the specific CRT. If these adjustments are altered, the landing correction signals are also changed its correction amount.

Partial Correction Signal

When the monitor is installed, there may be occasion that the direction correction cannot cover the landing error fully. Then the most precise landing correction adjustments are provided by this partial correction system.

Respective six LCCs are equipped with the adjustments of RV1 through RV6 on the W board, that are used for the partial correction of the landing error. Each outputs are connected to the analog switches of IC1, IC2 so that each correction circuits can be switched on or off by the switch S3 depending upon the need for partial landing correction.

LCC Drive Block

Each correction signals are added by the sum amplifiers that are connected to the analog switches of IC19, IC20, and then applied to the constant current circuit consisting of operational amplifier and complementary output circuit. These analog switches of IC19, IC20 stops flowing the current through the LCC during when the internal degaussing is operating and during when the switch S2 of the W board is in off position.

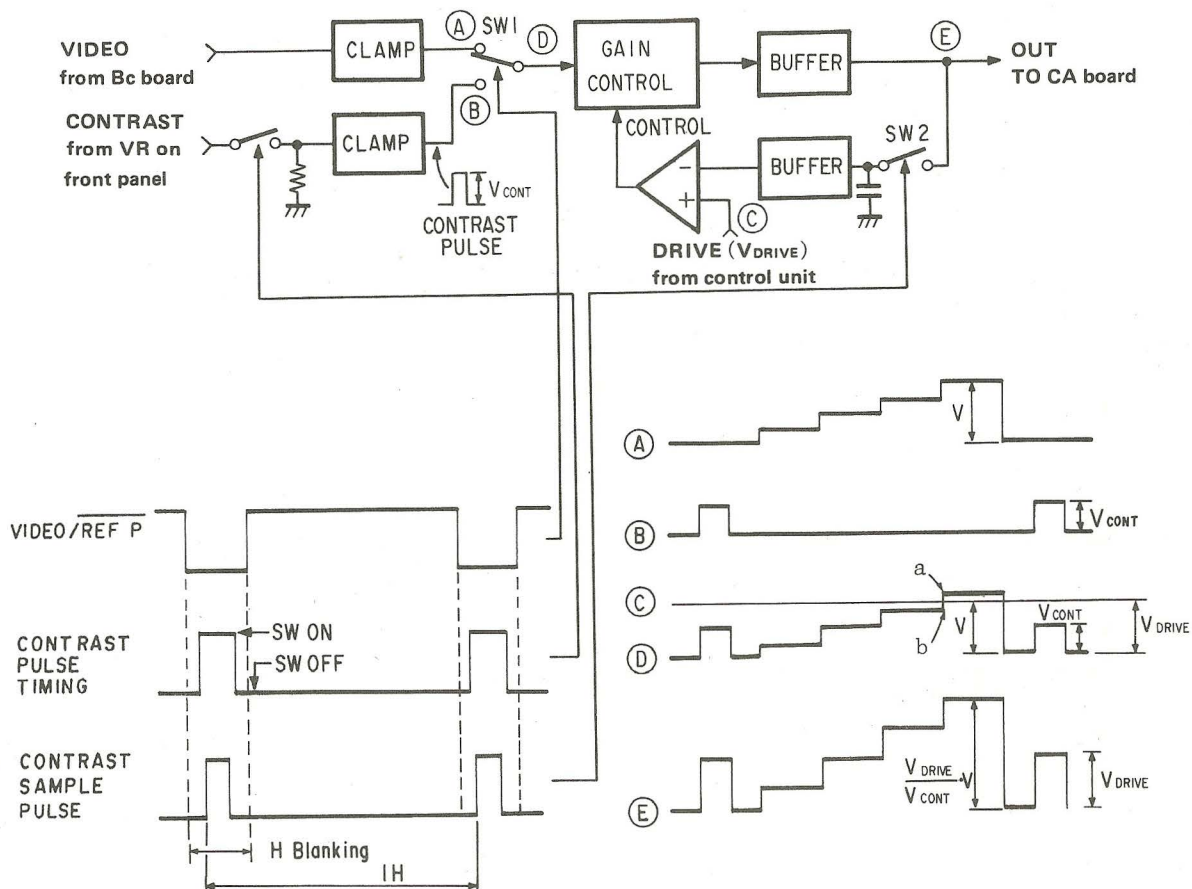
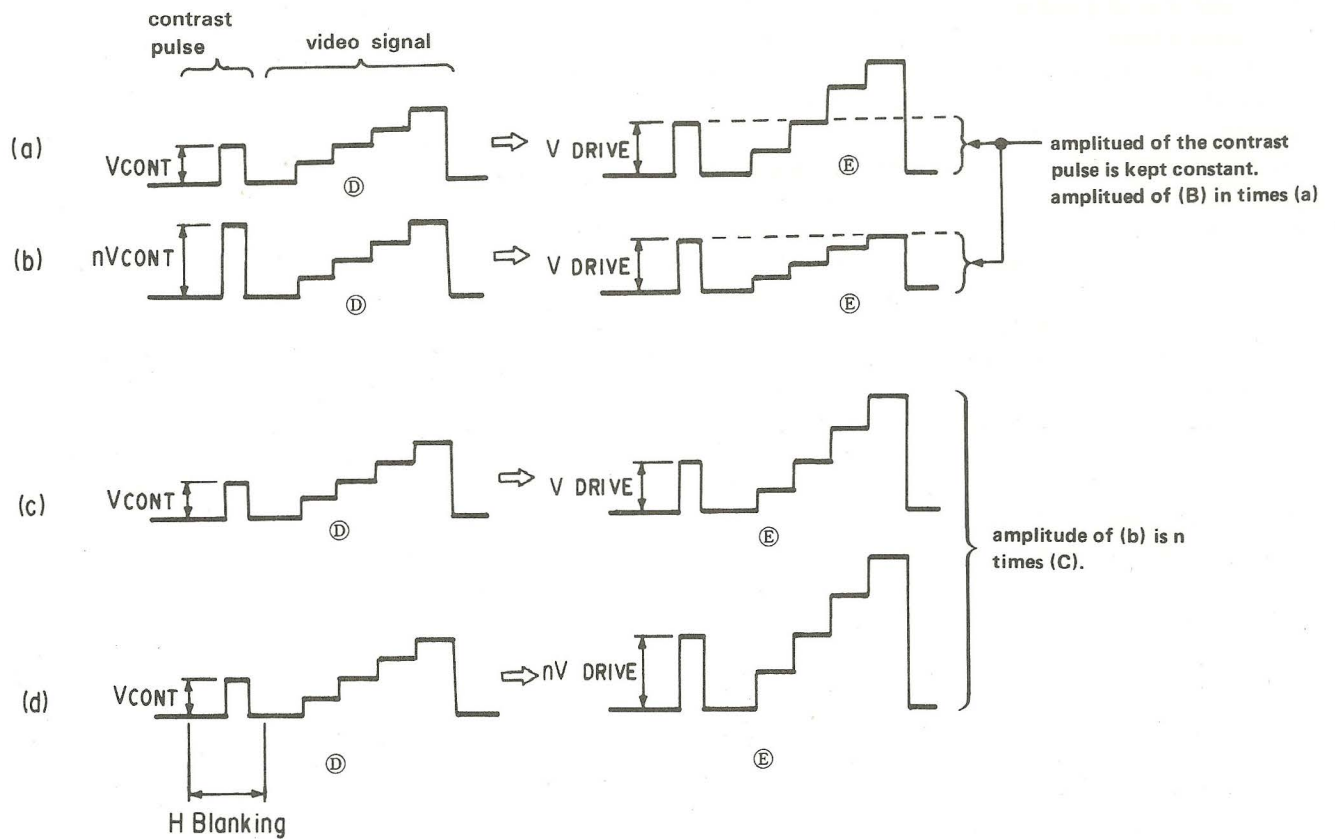
GAIN (Drive) and CONTRAST Control Circuit (BG, Bd BOARD)

The Drive and the Contrast are controlled by the BG board and the Bd board. Each circuit descriptions are discussed in latter section. Here the control method of the Drive and Contrast are discussed.

The Drive and the Contrast are controlled by the contrast pulse that is inserted during the horizontal blanking period. This method can remove the adverse effect of the amplifier gain's drift etc., that results in the contrast change and in the white peak's color temperature change. This contrast pulse is generated by the BG board. Amplitude of the contrast pulse is determined by the front panel CONTRAST control. The contrast pulse is routed to the switch SW1 of the Bd board. This switch SW1 is operated in the timing as shown in the following illustration so that the contrast pulse is inserted in the horizontal blanking period. The switch SW1 outputs the video signal (D) that has the contrast pulse inserted. This output signal is routed through the gain control buffer and then output to the CA board. Amplitude of this output contrast pulse is sampled by the switch SW2 and is then compared with the drive voltage V_{DRIVE} that is pre-set by the control unit located inside the drawer. The error voltage output from the comparator circuit becomes the control signal of the GAIN CONTROL. The gain control operation is performed until the contrast pulse amplitude is equal to that of the V_{DRIVE} signal. The gain is V_{DRIVE} , V_{CONT} . If either the V_{DRIVE} is multiplied by n times or the V_{CONT} is multiplied by $(1/n)$, the output signal is multiplied by times n . The V_{CONT} is adjusted by the front panel CONTRAST control and the V_{DRIVE} is adjusted by the control unit.

The relationship between the input signal and the output signal ((D) and (E) in the block diagram) of the GAIN CONTROL, when the Contrast and the Drive are adjusted, is shown in the illustration.

The (a) and (b) show the case when the V_{CONT} is multiplied by n times while the V_{DRIVE} is kept constant. The (c) and (d) show the case when the V_{DRIVE} is multiplied by n times while the V_{CONT} is kept constant.



Bias and Bright Control Circuit (BG, CA BOARD)

The Bias and Bright control operations are performed in the BG board and the CA board. Respective circuit description is discussed later. Here the Bias and Bright control methods are described.

The Bias and Bright controls are performed by using the bright pulse that is inserted during the vertical blanking period, and finally by controlling the cathode current. This system of the bias and bright control circuit removes change in the black balance that is due to the temperature drift of circuits and CRT or due to change with elapsed time.

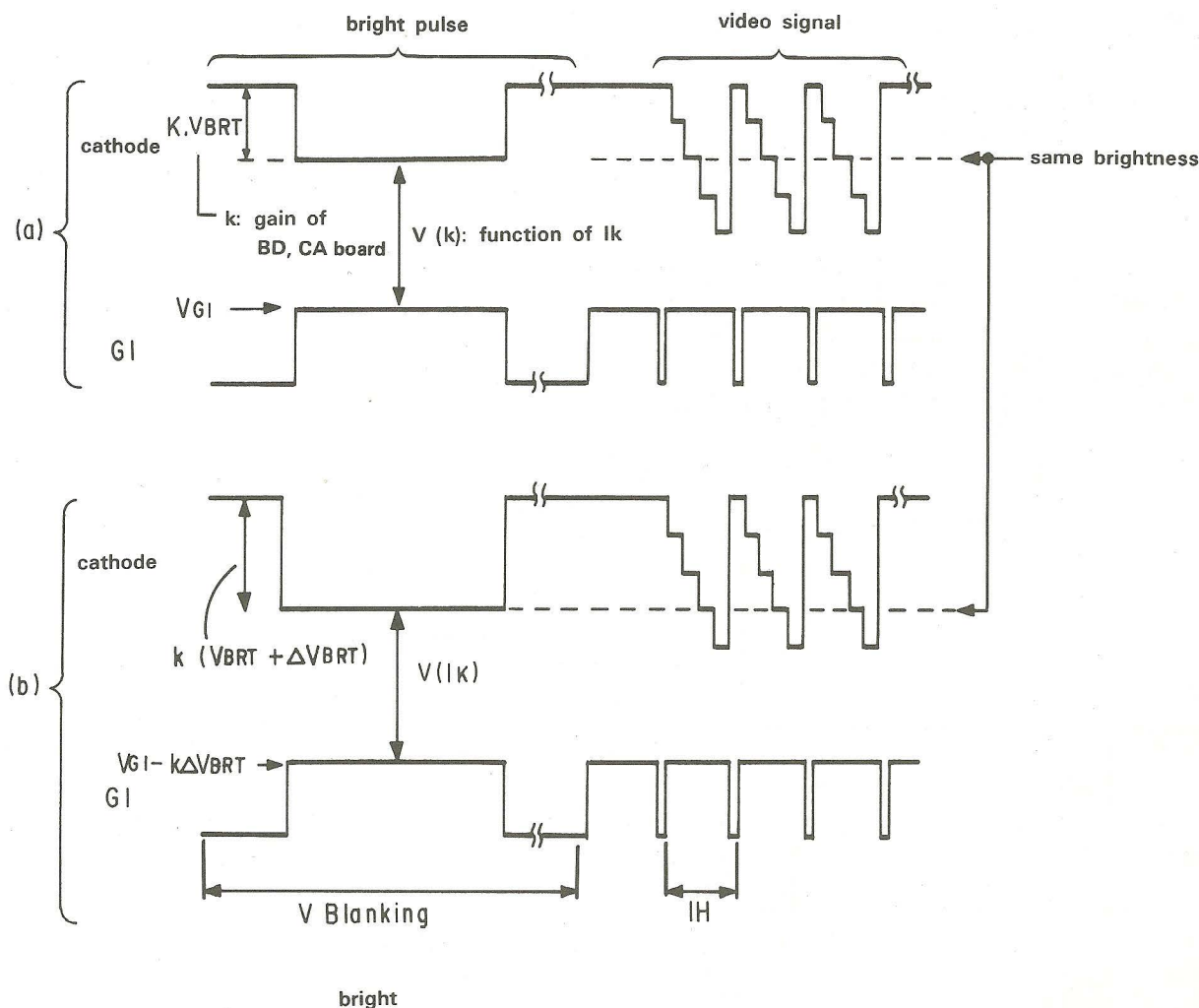
The bright pulse is generated in the BG board. Amplitude of the bright pulse is determined by the front panel BRIGHT control. The bright pulse is mixed with the contrast pulse, and then are input to the BD board's switch SW1. The switch SW1 performs switching as shown in the following illustration so that the video signal with the bright pulse inserted in the vertical blanking period is output as (d) in the illustration.

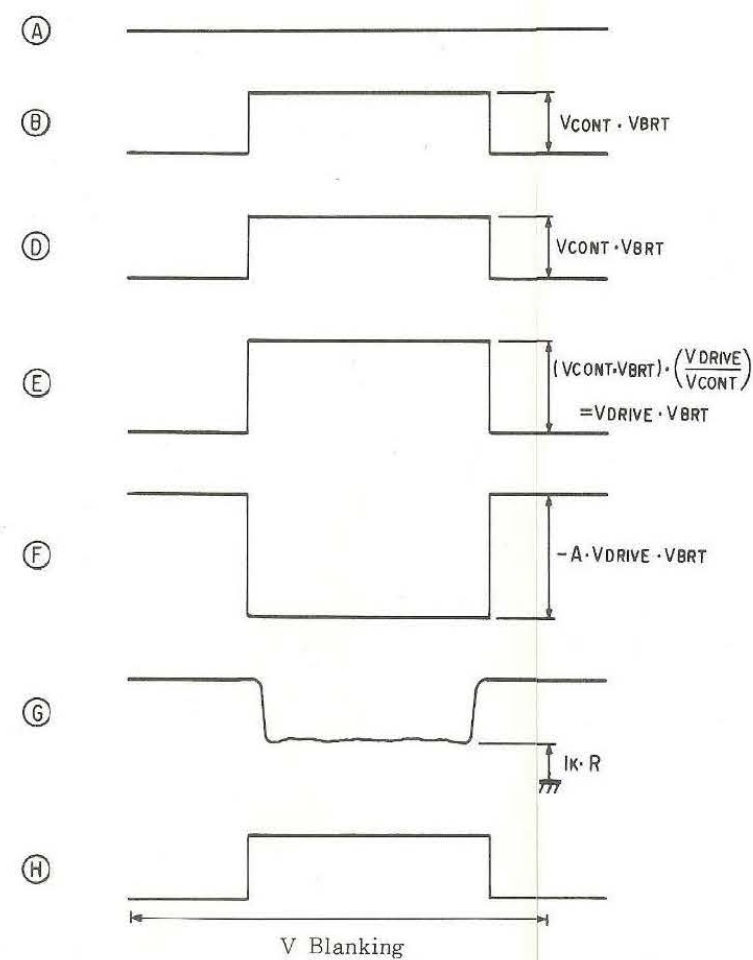
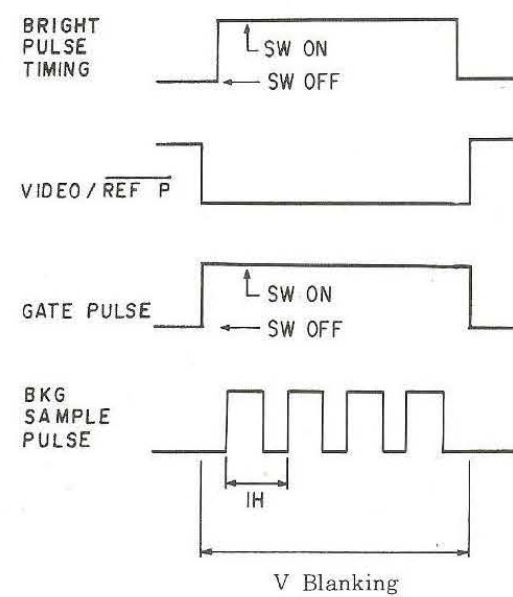
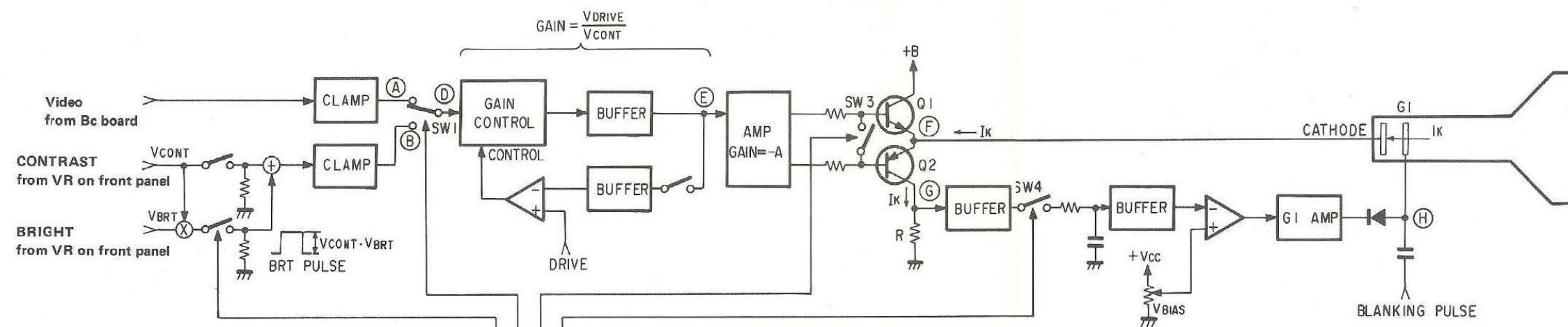
This video signal is buffered by the gain control buffer amplifier, and then output from Q1/Q2 that drive the CRT

cathode. The switch SW3 is turned on during the bright pulse period. During the SW3 on period, Q1 is cut-off so that the cathode current I_k which is proportional to the bright pulse amplitude, flows through Q2 collector. This current I_k is converted by a resistor to voltage signal that is sample-held by the switch SW4. The voltage difference between this voltage ($I_k R$) and the V_{BIAS} is amplified and sent to the CRT's G1 in order to control the I_k . When the ($I_k R$) is bigger than V_{BIAS} , the G1 voltage decreases to reduce the I_k . This feedback loop operates in this manner until the stable state of ($I_k R$) = B_{BIAS} is established. As long as the B_{BIAS} is of constant value, the I_k which is the brightness of the CRT is kept constant.

Brightness of the CRT can be controlled by changing the amplitude of the bright pulse. As the front panel BRIGHT control is turned from B_{BRT} as shown in a in the following illustration to $V_{BRT} + \Delta V_{BRT}$ as shown in b in the following illustration, the monitor screen is darkened.

The bias adjustment is done by changing the $V(I_k)$.
(Since $I_k = V_{BIAS}/R$, the I_k can be controlled by V_{BIAS} .)





FLOATING TYPE INPUT BUFFER (QA, QB, QC BOARD)

The captioned three circuit boards are connected to the BNC input connectors, having the input buffer function.

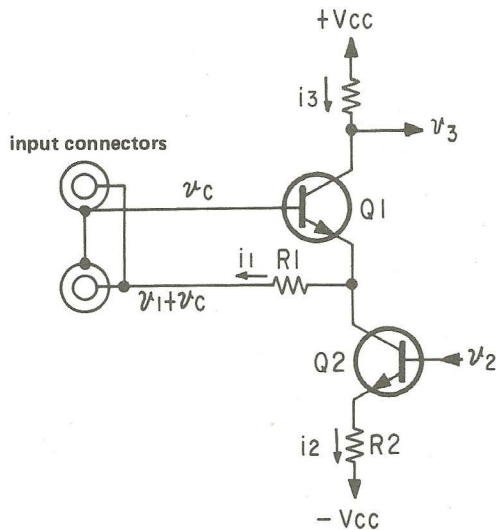
These three boards receive power supply from the BA board. As input signal is selected by the INPUT A, B select switch, etc., the selected circuit board alone receives power supply while the other circuit boards receive no power as power is turned off by the input selector switch.

R, G, B, EXT SYNC channels' Input Buffer

The input buffer circuit comprises the input stage Q1, Q2, the cascode connected high gain amplifier Q3, Q4 and the emitter follower. The negative feedback is applied to form the wide band-width amplifier.

Input Stage

The input signal ($v_1 + v_c$) is applied to Q1 emitter through R1 while the ground (v_c) of the input signal is connected to Q1 base. This circuit configuration can remove the common mode noise of the input signal. The output signal (v_2) from the output buffer is fed back to Q2 base. Gain is shown in the equation 1.



$$i_1 = \frac{v_c - (v_1 + v_c)}{R_1} = -\frac{v_1}{R_1}$$

The voltage across R1 becomes V_1 . (V_c is removed.)

$$i_2 = \frac{v_c}{R_2}$$

$$i_3 = i_1 + i_2$$

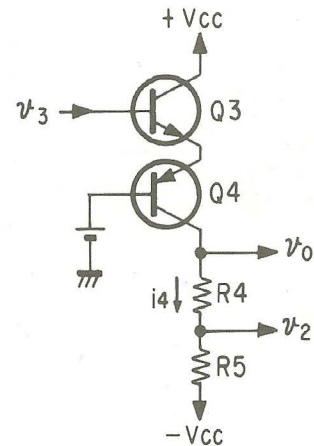
$$v_3 = -i_3 R_3$$

$$= \frac{R_3}{R_1} v_1 - \frac{R_3}{R_2} v_2 \quad \text{..... ①}$$

High gain amplifier

The input signal v_3 is input to Q3 base. Output is obtained from Q4 collector.

Gain of this stage is shown in equations ②, ③.



If the emitter resistors of Q3, Q4 are " r_e ".

$$r_e = \frac{kT}{q} \frac{1}{I_c} = \frac{26 \times 10^{-3}}{I_c} [\Omega]$$

$$i_4 = \frac{v_3}{2r_e}$$

$$v_0 = i_4 (R_4 + R_5)$$

$$= \frac{R_4 + R_5}{2r_e} \cdot v_3 \quad \text{..... ②}$$

$$v_2 = \frac{R_5}{2r_e} v_3 \quad \text{..... ③}$$

Output Buffer's total gain

The v_2 and v_3 are removed from the above calculated equations ①, ②, ③.

$$v_0 = \frac{R_3}{R_1} \frac{R_4 + R_5}{2r_e + \frac{R_3}{R_2} \cdot R_5} v_1$$

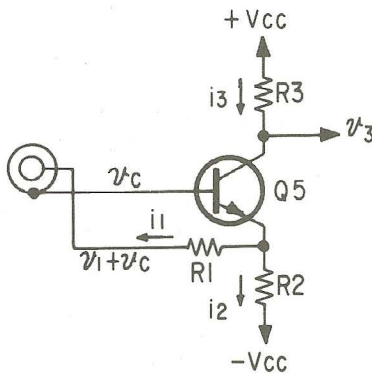
$$= \frac{R_2}{R_1} \left(1 + \frac{R_4}{R_5}\right) \cdot v_1 \quad (\because 2r_e \ll \frac{R_3}{R_2} \cdot R_5)$$

Since $R_1=13$ kohms, $R_2=4.7$ kohms, $R_4=2.2$ kohms and $R_5=1$ kohms, the gain is unity ($=1$) gain.

HD, and VD channels' Input Buffer

The input buffer consists of the input stage Q5 and an emitter follower.

Following is the description on the input stage.



$$i_1 = \frac{v_c - (v_1 + v_c)}{R_1} = -\frac{v_1}{R_1}$$

$$i_2 = \frac{v_c}{R_2}$$

$$i_3 = i_1 + i_2$$

$$v_3 = -i_3 R_3$$

$$= \frac{R_3}{R_1} v_1 - \frac{R_3}{R_2} v_c$$

$$= \frac{R_3}{R_1} v_1 \quad (\because R_3 \ll R_2)$$

Since $R_1=680$ ohms and $R_2=1.5$ kohms, the gain is 2.2 times.

INPUT SIGNAL SELECTION (BA BOARD)

The BA board has function of selecting the input signal and also the power supply control for QA, QB, and QC boards.

The A-channel video signals (R/Cw, G/Y, and B/CN) from the QA board and the B-channel video signals (ditto) from the QB board are input to IC101/IC102/IC103 (LA7016) where either A-channel or B-channel is selected. The selected output video signal from these switching ICs, is buffered by Q101, Q102, Q103, is output from the BA board and is input to the Bb board. The EXT SYNC input is at the same time routed from the QC board, is fed to the one input of the video switch IC202, while the other input of this video switch IC202 is receiving the G/Y signal from Q102. Selection of either SYNC INT/EXT is performed by this video switch IC202. The selected output sync signal is buffered by Q203, and is input to the Bf board (SYNC PROCESS).

The HD and VD signals from QC board are clamped by D201/D203, buffered by Q201/Q202 and are input to the Bf board.

Power Supply Circuit for QA, QB, and QC Boards

The power supply circuit for QA board is composed by IC305/Q301/Q302. The power supply circuit for QB board is composed by IC306/Q303/Q304. The power supply circuit for QC board is composed by IC307/Q306/Q307. The original power supply the these respective power supplies, is the $\pm 9V$ tracking power supply whose output can be turned OFF by grounding the IC's ⑧ pin. Therefore the B-channel power can be turned off while the A-channel is selected. The A-channel power can also be turned off while the B-channel is selected in the same manner. When the internal TEST signal is selected, all the power supplies to QA, QB, and QC boards are turned off.

YPbPr SIGNAL PROCESS, AND GBR APERTURE CONTROL CIRCUIT (B_B BOARD)

GBR/YPbPr selection, YPbPr to GBR conversion, and aperture control.

Major circuit blocks are the YPbPr signal process circuit and the GBR aperture control circuit.

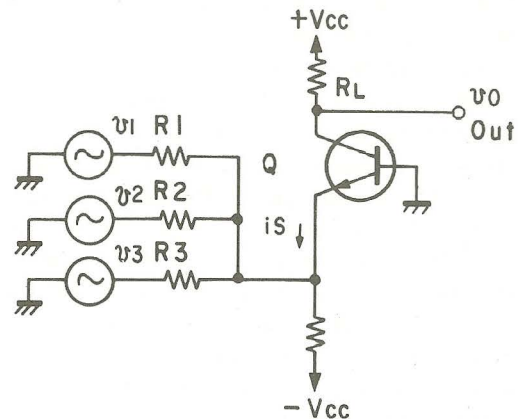
IC6, IC7, IC8 (LA7016) are the GBR/YPbPr select switch. When YPbPr input is selected, input signals are routed through the YPbPr signal process circuits and are then input to the GBR aperture control circuit. When the GBR input is selected, input signals are directly applied to the GBR aperture control circuit. When YPbPr input is selected, the YPbPr signals are fed to the analog switches of IC1, IC3 that is the switch in order to separate the P_R and the P_B signals in the B&W mode. The Y signal is input to the analog switch of IC2 that is the selection switch of either internal TEST signal or the Y signal. Therefore, the TEST signal is input to the Y signal circuit in the YPbPr signal process circuit in place of the Y signal. These YPbPr signals are passed through respective analog switches and then fed to the YCwC_N to GBR conversion matrix circuit. Its output GBR signals are fed to the selector switches of IC6, IC7, IC8 ⑦ pins where either the matrix output GBR or the direct input GBR are selected. The output signals are routed to the GBR aperture control circuits and to the COLOR/B&W select switches, and then fed to the output.

YPbPr to GBR Conversion Matrix Circuit

This conversion is performed in order to realize the following equations.

$$\begin{pmatrix} G \\ B \\ R \end{pmatrix} = \begin{pmatrix} 1 & -0.226 & -0.477 \\ 1 & 1.826 & 0 \\ 1 & 0 & 1.576 \end{pmatrix} \begin{pmatrix} Y \\ P_B \\ P_R \end{pmatrix} \dots ①$$

This conversion requires the addition of the video signals. The video signal adding is performed by the following circuit.



Now the video signals v1, v2, v3 are respectively multiplied by the coefficients K1, K2, K3, and are added together. That is:

$$v_o = K_1 v_1 + K_2 v_2 + K_3 v_3 \dots ②$$

The equation mentioned above can be obtained.

Assuming that the emitter resistance "Re" of the transistor "Q" whose base has been grounded in the Fig. is exceedingly small as with R1, R2, and R3, the signal current "is" which flows to the emitter of "Q".

$$i_s = \frac{v_1}{R_1} + \frac{v_2}{R_2} + \frac{v_3}{R_3} \dots ③$$

If hfe of the transistor Q is high enough, approximately the "is" CURRENT FLOWS IN THE Q's collector. So, output from the collector is the voltage "vo":

$$v_o = R_L i_s = \frac{R_L}{R_1} v_1 + \frac{R_L}{R_2} v_2 + \frac{R_L}{R_3} v_3 \dots ④$$

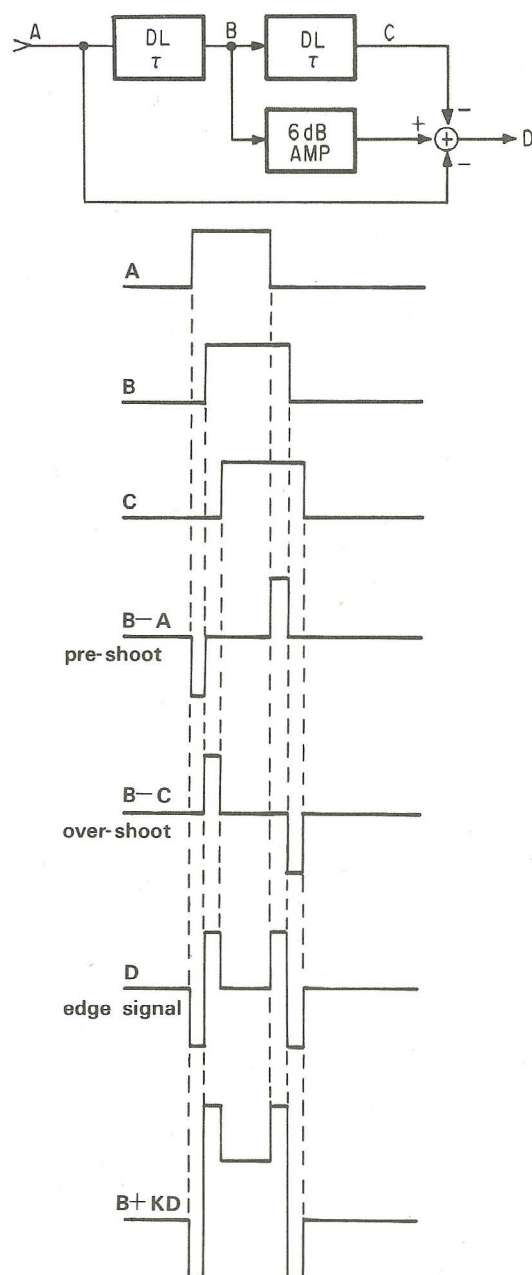
Therefore the above described coefficients are:

$$K_1 = \frac{R_L}{R_1}, \quad K_2 = \frac{R_L}{R_2}, \quad K_3 = \frac{R_L}{R_3} \dots ⑤$$

Followings are the description using the actual circuit. The P_B signal is buffered by Q1, Q2, the Y signal is buffered by Q9, Q10 and the C_N signal is buffered by Q17/Q18 respectively and are routed to the matrix circuits. Since the P_B signal and the P_R signals are having negative coefficient as shown in equation 1, polarity inversion is needed. The polarity inversion is performed by IC4 and IC5 (BX1190). The matrix is performed by Q3, Q11, Q19. The matrix output GBR signals at respective collectors are routed to the emitter followers of Q4, Q12, Q20, then to the level shift of D6, D12, D15, and are finally output.

Aperture Control Circuit

This circuit is adding pre-shoot and over-shoot to edge signal of the video image. Therefore, edge signal is emphasized by this circuit. This circuit uses delay lines in order to generate the edge signal by addition/subtraction operation among the delay line output signals. The output edge signal is then added to the original video signal. Its operating principle is shown in the following illustration. The signal A is the original video signal. The signal B is the delayed video signal where the signal A is delayed by " τ " to make the signal B. The signal C is the further delay signal where the signal B is again delayed by " τ " to make the signal C. The pre-shoot signal is made by B-A subtraction. The over-shoot signal is made by B-C subtraction. The pre-shoot and the over-shoot are added to make the edge signal of $2B-(A+C)$ is obtained. Amplitude of this edge signal is adjusted and is added to the video signal B. Then the edge-corrected video signal is obtained. This is the fundamental idea of the aperture control operation.



Frequency response of this aperture correction circuit is obtained as follows. When the sinusoidal wave signal ($E \sin 2\pi f t$) is input,

$$\begin{aligned} D &= -E \sin 2\pi f t + 2E \sin 2\pi f (t - \tau) - E \sin 2\pi f (t - 2\tau) \\ &= 2E (1 - \cos 2\pi f \tau) \sin 2\pi f (t - \tau) \end{aligned}$$

Therefore the output is the delayed signal of the input signal by " τ ", having the gain of $2E (1 - \cos 2\pi f \tau)$.

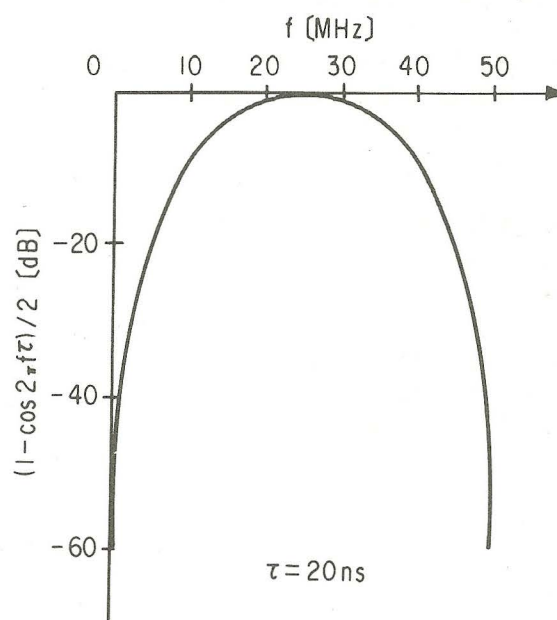
The frequency whereby the gain becomes maximum is written into the following equation.

$$\cos 2\pi f \tau = -1$$

$$\text{from the above, it becomes } f = \frac{1}{2\tau}$$

Since the delay line of $\tau = 20 \text{ ns}$ is used, it becomes a 25 MHz MAX aperture circuit.

The frequency response of D is shown in Fig. below.



The aperture control circuit in the B_B board is to generate the edge correction signal for the G, B, R signals. The method to generate the edge signal is as follows. Y signal is first generated from the GBR signals by matrixing them. The Y signal is fed to the edge signal generating circuit where the edge signal is generated for the Y signal. This edge signal is gain-controlled and is distributed to respective G, B, R signals.

Following is the circuit description referring actual circuit. The resistor matrix network is located in the emitter circuit of the common-base transistor Q25. As the kRGB signals are fed to this matrix network, the Y output signal is output from Q25 collector. This Y signal output is passed through emitter follower Q26, level shifter D19, and is output from emitter follower Q27. This Y signal output is again buffered by Q28, 20ns delayed by the delay line DL4. It is again buffered by Q29/Q30 and 20ns delayed by DL5.

Digital Uniformity ON/OFF

The analog switch IC106 usually selects the gain-controlled video signal for white uniformity correction. But if the $\overline{\text{DELAY}}$ is off (LOW), or the digital uniformity correction is off (LOW), the video signal that is not gain-controlled, is selected.

Video Off

The multiplier IC104 has the control inputs that have the differential input circuit configuration. If the $Y \ominus$ input of IC104 receives the higher voltage than the control signal, the control voltage becomes negative in all. Then the video amplification gain can be less than 0. This circuit operation is utilized when the PROM data are used.

CONTRAST AND GAIN (DRIVE) CONTROL CIRCUIT (B_D) BOARD

Following is the discussion regarding R channel only. The Grand B channels operates in exactly same manner.

Back Porch Clamp Circuit

This circuit is composed of Q101 through Q105 which is amplifier with the dc level-shift function. Gain is obtained as the following equation.

$$\frac{R107}{R103/R104} \cdot \frac{R111}{R109}$$

Gain is approximately 1.4 times.

The DC level shift can be done by adding any DC signal to Q104 base.

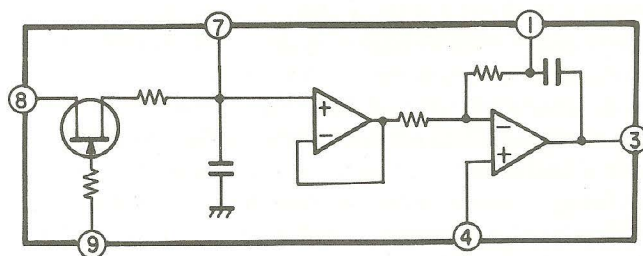
IC101 is a comparator as shown in the following illustration, which is the SONY BX-1313 type comparator equipped with a sample-and-hold circuit. Input signal is feed to pin-⑧ which is sampled as long as the sampling pulse at pin-⑨ is HIGH. The sampled voltage is held at pin-⑦ until next sampling pulse is input.

The sampled voltage at pin-⑦ is compared with the reference voltage input Vref signal at pin-④. If the V is higher than Vref, the LOW level is output. If the V is lower than Vref, HIGH level is output.

This IC101 functions as a clamp circuit too. If a back porch clamp pulse is input to the pin-⑨, and if pin-③ is connected to Q104 base, then the Q105 emitter output's back porch is clamped to the Vref level. the Vref signal and the back porch clamp pulse are sent from the B_G board. During the Delay mode operation, the Vref is increased and the pedestal level is also increased.

The capacitor C107 is determining the calmp time constant.

approximate circuit diagram of IC101 (BX-1313)



VIDEO/REFERENCE PULSE Select Switch

IC102 (LA7016) is the analog switch that receives the clamped video signal input to pin-② while the clamped reference pulse is input to pin-⑦. The reference pulse is the mixtured pulse of the bright pulse and the contrast pulse at the B_G board. Its pin-③ is receiving the selection control signal for this analog switch. By this pin-③ signal, the switch is set to the pin-⑦ as long as the reference pulse is present. Therefore, the video signal with the reference pulse inserted, is output from the IC102 pin-④.

RGB ON/OFF Circuit

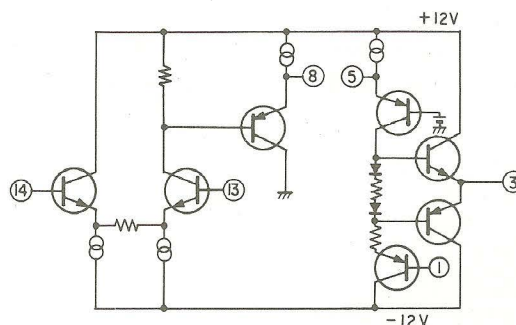
When the control unit's RGB ON/OFF switch selects the OFF position, cathode receives no signal ad the G1 potential is also decreased. The G1 potential is controlled by CA board. This OFF signal of the RGB ON/OFF switch removes the video signalat the BD board as this signal is input to Q108 base. For example, If this switch is set to the R OFF position, Q108 is turned ON that put IC102-③ pin LOW to connect the IC102 input to the ⑦ -pin so that the video signal at ② -pin is not output.

CONTRAST/GAIN Control Circuit and Pedestal Clamp Circuit

IC103, IC104, IC106, IC107 are constituting the CONTRAST/IN control circuit and the pedestal clamp circuit.

The IC103 is a differential amplifier having the capability of DC level shift. If a variable resistor is connected between pin-⑤ and pin-⑧, the gain control becomes possible. If the pin-①'s DC level is changed, the level shift becomes possible.

IC103 (BX-1315) equivalent circuit



IC104 is used as a variable resistor connected in between pin-⑤ and pin-⑧. IC104 is a voltage-controlled variable resistor where V4, V6 are the control voltages. The resistance value (taken as R13) between pin-① and pin-③ can be changed by varying the voltages of V1-V6 and V3-V4. (V1-V6 is the potential of pin ① - pin ⑥.) V4 is controlled by the CONTRAST control and the GAIN control.

C119 is used to modulate the V6 with V1 until V1-V6=V3-V4=dc.

If C119 does not exist, V1-V6=ac is established so that R13 is modulated by V1, that results in waveform distortion.

Q106 is installed so that IC104-⑥ pin can follow the -④ pin change when the -④ pin voltage is changed.

Q106 is turned on during the blanking period.

IC106 samples the CONTRAST pulse and is controlling the resistance value of IC104. It receives the Contrast pulse's sampling pulse at pin-⑨ that has the same timing as the CONTRAST pulse. It receives the video signal with the CONTRAST pulse inserted, at pin-⑧ so that it samples and holds the CONTRAST pulse's "level V". The sampled "level V" is compared with the reference voltage "Vref" that is input at pin-④. If the level V is higher than Vref, the LOW level is output. If the level V is lower than Vref, the HIGH level is output from pin-③. This output is routed to Q107 base, inverted by Q107 collector, and is input to IC104-④ pin. Therefore, If level V is higher than Vref, the IC104-④ pin becomes HIGH level that increases the IC104 resistance value that decreases IC103 gain to make the level V lower until level V = Vref is established. Thus, the CONTRAST pulse has feed-back loop so that it maintains the constant amplitude even though IC103, IC104, IC105 have drift.

IC106 is the pedestal clamp IC. Its operation is same as that of afore-mentioned IC101 clamp circuit.

Buffer Amplifier

IC105 is the video amplifier having approximately 30 times open-loop gain. It outputs signal to the CA board with 75 ohms.

INTERNAL SIGNAL GENERATORS (BE BOARD)

Clock Oscillator : X1, IC1(4A), IC2(4B)

Approximate 48 MHZ is oscillated by IC1(4A), IC2(4B). It is divided by 4 with IC2(4B) to obtain approximate 12 MHz that is the system clock.

Horizontal rate signal generator :

IC3(2C), IC4(3C), IC5(4C), IC6(3D), IC7(3E)

IC3, IC4, IC5 are the hexadecimal dividers that generates the 9 bit digital data (from 0 to 362 count at 1H) that is supplied to IC6 as the address data. The timing data of eight signals such as 2fH, H.SYNC, B1, H.HATCH, G1, G2, LATCH CLK, and CLEAR are memorized and located in IC6. The memory page is switched by the system A and B signals input to pins-②⑤ and -②⑥ of BE-1, selecting one among four timings.

Vertical Rate Signal Generator :

IC8(1F), IC9(2F), IC10(2E), IC11(1E), IC12(1J), IC13(2J)

The 2fH signal is used as the clock pulse that is divided by 1125 times. As the timing is determined by the clock input, the vertical rate signals such as V.SYNC, B2, V.SYNC', V.HATCH, G3, G4, G5, and CLEAR are output. G3, G4, G5 are latched by the H. SYNC signal.

H. and V. Pattern Signal Generator :

IC15(1E), IC16(1D), IC17(1C), Q7

The signals such as B1, G1, G2, B2, G3, G4, G5, CONT-A/CONT-B are input and are used to determine the output video signal amplitude and generate the video signals such as "SET UP", "FLAT FIELD" and "GRY SCALE". The video signal amplitude (D/A convertor) is determined by the constant current source Q7, resistor array and open collector array.

HATCH Signal Generator : IC21(2D), IC23-1/4 (3J-1/4), Q6

The H.HATCH signal is determined to have approximate 35ns pulse width by R15, C15 that is mixed with the V. HATCH signal. The mixed signals are sent to Q6 base. If the HATCH signal is selected to be output, the FLAT FIELD is also automatically selected so that these two signals are mixed by Q6 to generate the HATCH signal.

SYNC Signal Generator

Receiving the afore-mentioned H.SYNC, V.SYNC, and V.SYNC" timing signals, the specified output signals of H.SYNC, V.SYNC, and COMPOSITE SYNC are generated.

The H.SYNC and V.SYNC signals are output by the inverter/open collector to be pulled up the \oplus power supply. The COMP SYNC is output through buffers Q8 and Q9.

Video Buffer : Q4, Q5

The afore-mentioned H.V pattern signal and the hatch signals are output through Q4, Q5 with 75 ohms.

Inverter, Dot Signal Generator and Brightness Control: IC23(3J), IC24(4H), IC25(4G), IC26(4F)

As receiving the external command input, brightness control of the output video signal, inversion of the hatch signal, generation of the dot signal are performed.

When the external command input is OPEN, all operations are set to NORMAL.

Generation of the PLUGE Signal (IC27, Q14 and Q15)

The PLUGE signal is superposed to the video signal generated by IC17 and output. When the PLUGE signal is set, the black signal data is output from IC17. When the PLUGE signal is not set, its output is inhibited by the signal from ④-pin of BE-14.

INPUT/TEST Control : Q1 through Q3

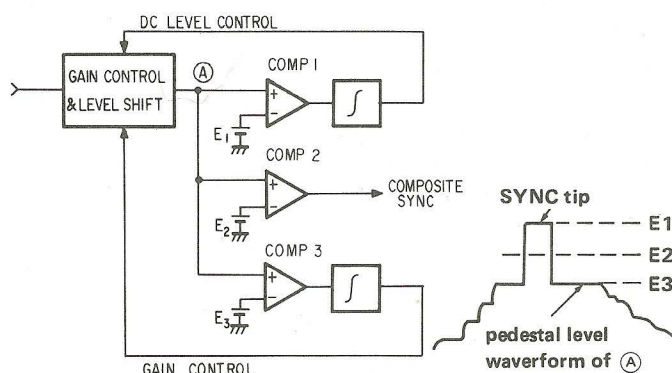
When external command input is input that enables external video input is allowed or TEST signal is allowed, the +5V power line is turned off. It is because that the external input video signal and the internally generated signal from the BE board will not make interference each other.

SYNC PROCESS CIRCUIT (Bf BOARD)

Sync Separator Circuit having Sync AGC Function

In order to establish the AGC circuit using input sync signal as the reference signal, an amplifier that can detect and control the amplification gain and dc level is necessary.

Fundamental circuit is shown in the following illustration. The sync signal is amplified by the GAIN CONTROL & LEVEL SHIFT amplifier that provides the inverted output to each of the comparators of COMP-1, -2, -3. The comparator COMP-1 provides output so that the sync tip's dc level becomes E1 as shown in the illustration. The other comparator COMP-3 provides the GAIN CONTROL signal so that the output pedestal portion has the E3 level. These control signals are fed back to the GAIN CONTROL & LEVEL SHIFT amplifier so that the comparator COMP-2 provides the composite sync signal having the specified sync amplitude and dc level.



The GAIN CONTROL & LEVEL SHIFT circuit is consisted by the IC102, Q108, Q109 and Q110. The gain control is done by IC102 MC1496 double balanced type differential amplifier. Its output is the current output that is input to Q108 common base amplifier's emitter.

It is fed then to Q109 common emitter amplifier where output is taken from its collector and sent to Q108 emitter through R141 for negative feed back.

Its output is buffered by Q110 emitter follower.

The DC level control is performed by changing the DC current flowing into Q108 emitter.

In this SYNC AGC circuit, the SYNC tip is fixed by the DC level control while the pedestal level is determined by the gain control. The output signal from Q110 emitter is input to Q111 comparator where signal is integrated with shorter time constant

in order to react to the SYNC tip. The signal is feed back by Q112 and Q113 emitter follower in order to clamp the sync tip potential to the Q111 base potential. This integrator has the shorter time constant for sync period while it is designed to have longer time constant for video period by D102, R158 in order to hold the sampled value during the video period.

The output signal from Q110 emitter is sent to Q115 comparator that is the integrator to react only to the pedestal portion, not to the SYNC portion, by having the long time constant. The signal is then feed back by Q117 emitter follower in order to clamp the pedestal level to the Q115 base potential by determining the gain control factor.

The SYNC top level and the pedestal level is thus fixed so that the SYNC signal amplitude is always constant. This signal is sent to Q115 comparator where sync signal alone is separated that is amplified by Q114, and output through complementary buffers of Q119 and Q120. The negative polarity sync is thus output.

Equalizing Pulse Extractor Circuit

IC104 (2/2) is an equalizing-pulse sampling circuit. A pulse with a amplitude approx. $3/4H$ is generated by the IC104 built-in monostable multivibrator, then its inverted output (IC104-⑨ pin) is fed back into the input IC104-⑪ pin, sampling the input equalizing pulse by masking it.

Back Porch Clamp Pulse Generator Circuit

IC103, IC203, IC204, IC205, Q201, Q202 and Q203 compose a back-porch clamp pulse generator circuit. During HD input, the monostable multivibrators inside IC103 and IC203 delay the phase, and a negative polarity back-porch clamp pulse is output from IC203-⑨ pin. During INT SYNC or EXT SYNC input, a similar pulse is output from IC204-⑨ pin. The clamp pulse is selected at IC205, and it undergoes polarity inversion and waveform shaping at Q201. The resulting positive polarity back-porch clamp pulse is then output from the complementary buffer composed of Q202 and Q203.

The control signal for the selector IC205 is sent from the sync signal detector circuit composed of IC205, IC206 and IC204. Even when the HD signal is being input, the clamp pulse is generated from the sync signal if it is output from the sync separator circuit.

V Sync Selector Circuit

Q304, Q305, Q306, IC201 (2/4) and IC301 compose a V sync switching circuit. IC301 switches between the HD, composite sync and test V sync signals.

H. SYNC Selector Circuit

I105 is a H sync switching circuit. It outputs the HD signal when it is input, and the composite sync signal when it is not.

PULSE GENERATOR (Bg BOARD)

Pulse Generator Circuit to generate BRIGHT Pulse
Timing Generator Circuit for Brightness Pulse and Related Pulses

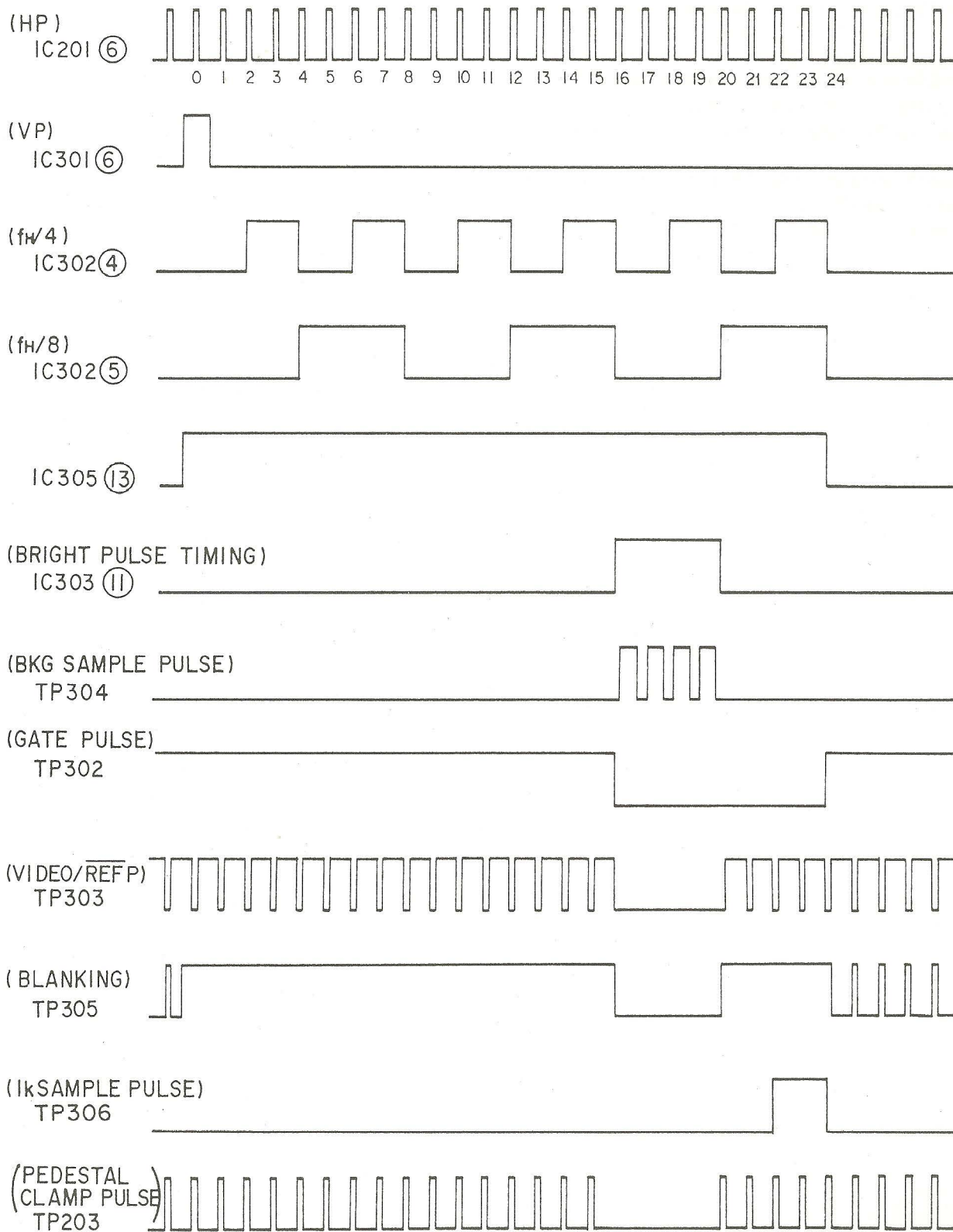
The brightness pulse, BKG sample pulse, gate pulse and video/REFP pulse used by the previously explained (3-13) bias and brightness control circuit are generated at this circuit.

The timing of these pulses is as shown on following the timing chart.

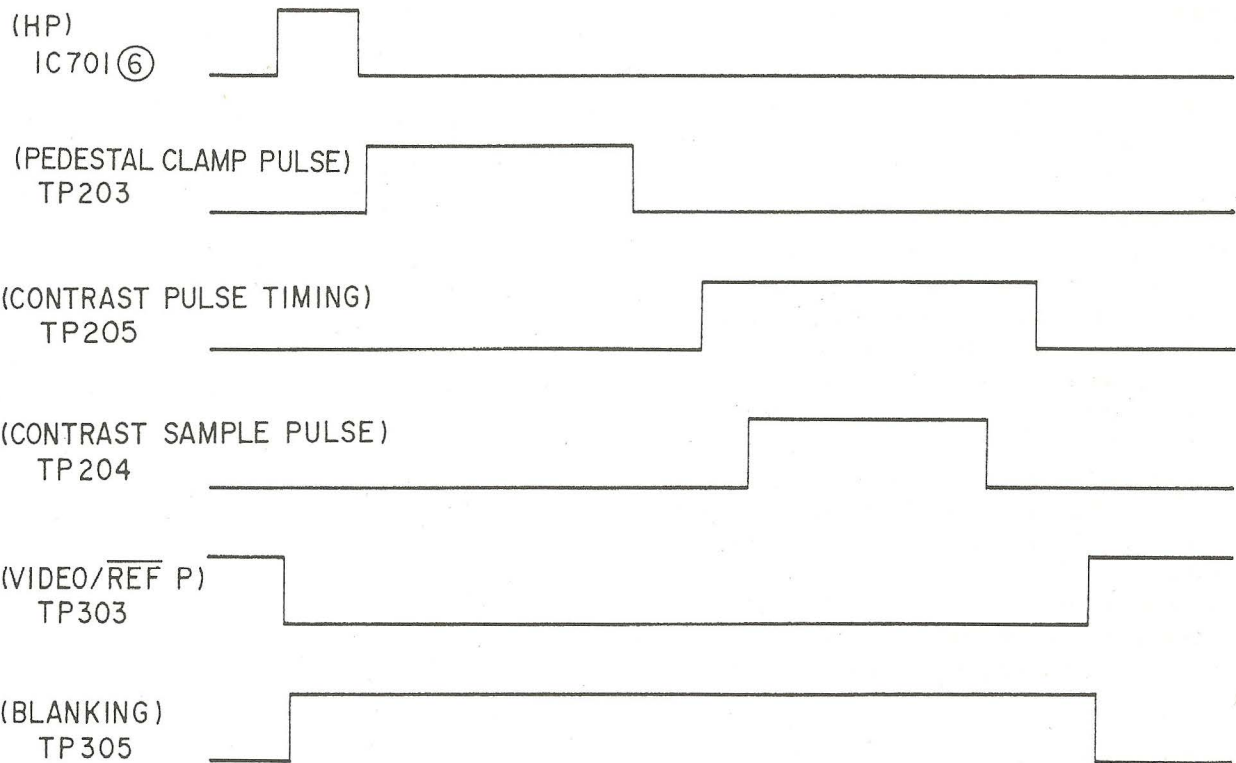
The H and V pulses generated at the deflection circuit (D board) are input to the CLK and CLR terminals of the counter composed of IC304 and IC305 to produce these pulses.



BG BOARD TIMING CHART 1/2 (V BLANKING PERIOD)



BG BOARD TIMING CHART 2/2 (H BLANKING PERIOD)



Timing Generator Circuit for Contrast Pulse and Related Pulses

The contrast pulse and contrast sample pulse used by the previously explained (3-11) gain and contrast control circuit are generated at this circuit.

The timing of these pulses is as shown on the following timing chart. They are generated from the H pulse generated at the deflection circuit (D board).

Reference Pulse Generator Circuit

The reference pulse is a combination of the brightness and contrast pulses. This pulse is superposed to the video signal at the BD board, then it is used at the bias and gain control circuit and the gain and contrast control circuit.

The brightness pulse amplitude can be changed with the brightness control on the front panel, and the contrast pulse amplitude with the contrast control.

Brightness and contrast control voltages are finally sent to the buffer inside IC102, and sampled by the above-mentioned brightness timing and contrast timing pulses at IC105 to become the brightness and contrast pulses.

These pulses are added by the adder composed of Q110 to Q113. The resulting pulse is clamped at the clamp circuit including Q115 to Q117 and IC103, then output as the reference pulse.

Delay Control Circuit

In the delay mode, this circuit increases contrast pulse amplitude and decreases brightness pulse amplitude. This results in less contrast and more brightness.

Clamp voltage of the BD board is also changed.

ABL Circuit

Q101 to Q104 compose a contrast ABL circuit.

It increases contrast pulse amplitude in case of a large ABL current.

Ik Sample Pulse Generator Circuit

This circuit detects faults in the blanking function on the Ca board.

This is achieved by sampling the cathode current value during the vertical blanking period (while the Ik sample pulse level on the timing chart is low).

A fault in the blanking function is detected when there is no blanking pulse and when voltage between the cathode and G1 drops. In this case, cathode current becomes larger than usual.

VIDEO OUTPUT (CA board)

Since R, G, B, have the exactly equivalent circuits, the R channel alone is discussed.

Pre-amplifier

Q1 through Q4 are the pre-amplifiers. Negative feed-back is applied from Q4 emitter output to input.

Open-loop gain A is given by the following equation

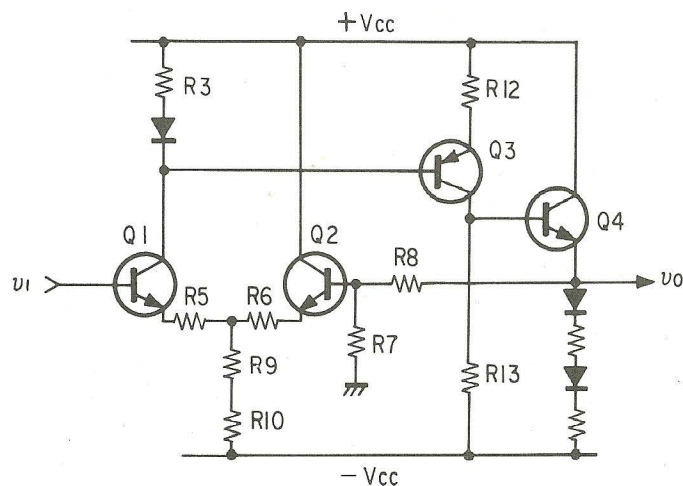
$$A = \frac{R_{13}}{R_{12}} \cdot \frac{R_3}{R_5} \cdot \left(1 - \frac{R_5}{R_5} \frac{R_6}{R_5} \frac{R_9}{R_5} \right)$$

$$\approx 15.9$$

The gain G when the negative feed-back is applied is given by the following equation.

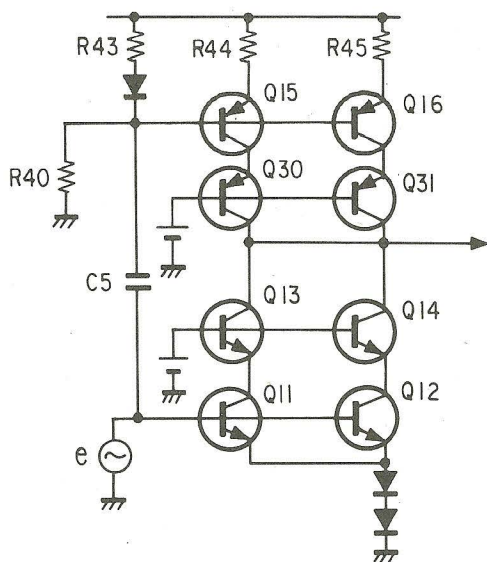
$$G = \frac{1}{\frac{R_7}{R_7 + R_8} + \frac{1}{A}}$$

$$\approx 2.4$$



VIDEO OUTPUT Circuit

The pre-amplifier output is sent to the feed-back amplifiers of Q11 through Q16, Q30, Q31 that has the feed-back resistor of R25, R26. This amplifier without feed-back resistor is shown as follows.

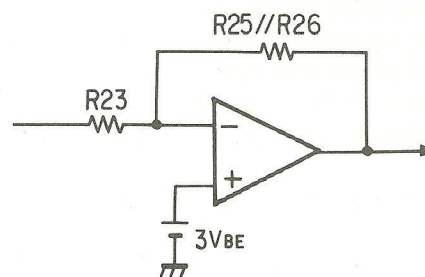


Basic structure of this amplifier is the cascode amplifier of Q11 through Q14. The current source of Q15, Q16, Q31 is its load resistance.

As Q15 and Q11 base is connected by C5, Q15, Q16 are driven by alternating way so that Q11, Q12, Q15, Q16 form the complementary operation.

Open-loop gain is almost infinite.

The equivalent circuit of this amplifier with the feed-back resistor installed, is shown in Figure The amplification gain is determined by $(R25//R26)/R23$.



Q17, Q18 are the buffer amplifiers whose output is sent to CRT cathode via C_B board.

Q19 through Q22 circuit is to cut-off Q17.

As Q22 base is set to LOW level, Q19 through Q21 are turned on to cut off Q17. Then Q18 collector current becomes the cathode current flowing from C_A-9 terminal. The resistor R51 is installed in Q18 collector that detects the cathode current.

The gate pulse that turns on/off Q17 is supplied from B_G board. This pulse has the same timing with the BRIGHT pulse. The resistor R51 detects the cathode current when the BRIGHT pulse is sent to cathode.

Blanking Circuit

G, B, R channels are controlling their respective G1 voltage independently.

The blanking pulse is sent from the deflection circuit and is wave-shaped by Q628 through Q633 to produce the blanking pulse output having 120 Vp-p. This pulse is distributed to G, B, R respective G1 circuits. The R channel G1 circuit alone is discussed as follows. The G1 potential control signal is input to Q24 base. This voltage is amplified by Q24, Q25 cascode amplifier and output via Q26 buffer. D24, C32 are the clamp circuit that clamps the the blanking pulse's HIGH level (prepared by Q630, Q631) to V_{G1} . This output is sent to CRT G1 via C_B board. If the control unit's R ON/OFF switch is turned OFF, Q24 base input becomes GND level potential. As Q24 base is set to GND level, Q25 is cut off to put G1 approx. -120V that cuts off beam.

Blanking Fault Detector Circuit

This circuit detects faults in the blanking function in order to prevent the appearance of light on the screen when cathode current increases during a blanking period due to the absence of the blanking pulse or a voltage drop between the cathode and G1.

The output from this circuit is sent into the HV stop circuit on the E board.

The various circuits operate as follows:

Q701, IC6 (2/2):

Determines the amount of R cathode current.

Q711, IC206 (2/2):

Determines the amount of G cathode current.

Q721, IC406 (2/2):

Determines the amount of B cathode current.

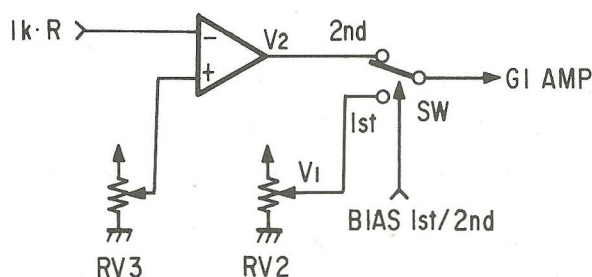
Q731: Determines whether the IK sample pulse is present or not.

Q751, Q752:

Determines whether the blanking pulse is present or not.

Black Balance Stabilizing Circuit

IC3, IC4, IC5 are the black balance stabilizing circuit. The control RV3 is to adjust the cathode current I_k that is the bias adjustment. This circuit is already discussed earlier in the Bias and Bright Control Circuit. Following is the description of RV2 and IC6.

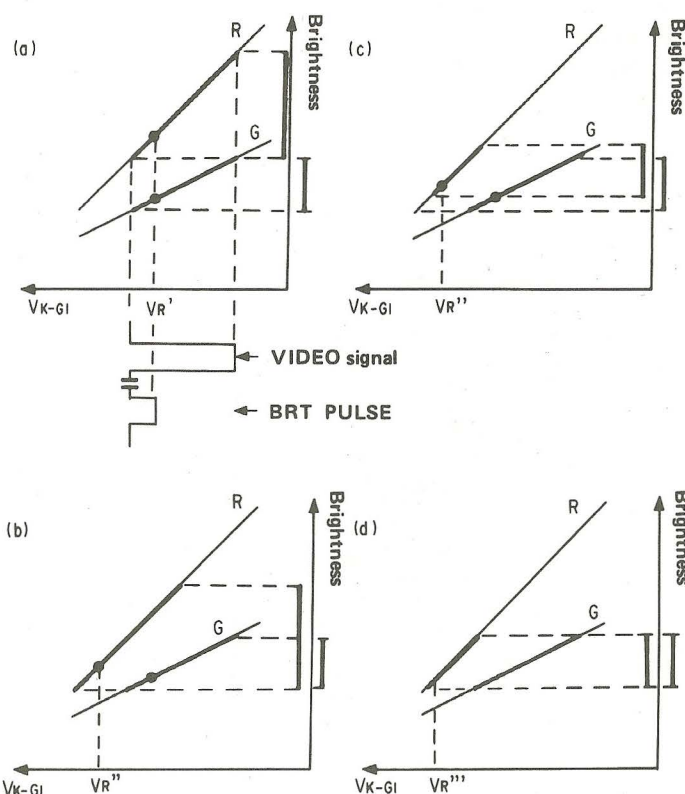


The control RV2 is installed in order to facilitate adjustment. If RV2 is not installed where adjustment should be made by RV3 alone, the gain and the bias adjustment should be made alternately until they track all the way. Following is the description for the necessity of RV2.

The initial conditions may have the unity amplitude and unity V_{K-G1} among RGB three channels, for example, as shown in fig.(a). (This fig.(a) is not showing B channel.) As fig.(a) is showing, the R channel has higher gain and bias, so that it is attempted to adjust the color temperature until fig.(d) condition is obtained. This adjustment is started with the R-gain adjustment as shown in fig.(c). Since the black balance stabilizer circuit is operating to maintain the bright pulse amplitude as constant value, the bright pulse's V_{K-G1} ($=V_R''$) is not affected by the R-gain adjustment. Only the amplitude

between the black level and white level is changed centering around V_R'' as shown in Fig.(c). It needs adjustment of fig.(b). Therefore, the adjustments of fig.(b) and fig.(c) should be repeated alternately until fig.(d) condition is obtained, as long as the black balance circuit is operating.

This adjustment can be completed by one time adjustment, not by repeating two adjustments alternately, if the black balance stabilizing circuit is temporarily disabled during adjustment. If the switch SW as shown in the following illustration is set to the 1st position, the V_{K-G1} can be determined by RV2 alone. Therefore, the adjustment is made as follows. The switch SW is first set in the 1st position, and adjust RV2 as shown in fig.(b) for bias adjustment. Adjust gain adjustment too as shown in fig.(d). Set then the switch SW in the 2nd position in order to operate the black balance stabilizing circuit, and adjust RV3 until $V_2 = V_1$ is established for color temperature adjustment. The alternate tracking adjustment is no more necessary.



GENERAL DESCRIPTION (N, ZA, Zc, ZD BOARDS)

Function

This block has the following functions.

- (1) Aperture control (aperture control adjustment, ON/OFF switch)
- (2) RGB ON/OFF
- (3) Internal SG/INPUT selection, internal SG output video pattern selection.
- (4) Color temperature adjustment
- (5) Digital convergence adjustment

Flow of Control

If the key switches on the N board is operated, the one-chip micro processor on the N board reads the information, codes the necessary commands, and transmit the data by RS422 in serial form. The RS422 serial data transmission is done by every 3 bytes in asynchronous system. This serial data is received by SIO on the Zc board, decoded by the CPU, and the decoded data are distributed to each port according to the command. The controls according to the key operation on the N board, is carried out.

The ports and memories that are controlled by the Zc board, are assigned as follows.

Zc RGB ON/OFF, NORMAL/TEST, SET UP etc.

ZA cursor ON/OFF, cursor position, internal SG pattern selection and other controls for the BE board, aperture, W-BAL control.

ZD digital convergence

Data Memory

The Zc (EEPROM) memorizes the color temperature and digital convergence data. The digital convergence data is up to rough No.13.

The ZD (S-RAM + BATTERY) memorizes the digital convergence data of rough No.14 and later so that the data is not lost even after Power OFF. The data is output to each ports when the Power is turned ON next time.

The data runs in the S-RAM on the Zc board during the adjustment, and is transmitted and memorized by the non-evaporating memory when the NORM/INPUT key is operated. Therefore, if power is turned OFF during adjustment, the set-up data that is established during the adjustment, will be lost. Please take care.

Dividing the Memories

Large memory capacity is provided as much as four times memory capacity of normally required, is installed. Use of memories is as follows.

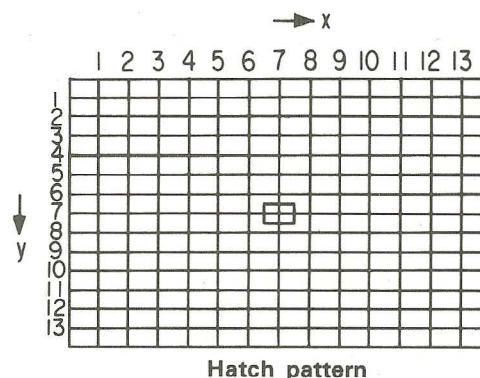
memory No.	convergence data	white balance data
1	HDTV SYSTEM A	PRESET/MANUAL A
2	HDTV SYSTEM B	PRESET/MANUAL B
3	PROGRESS SCANNING LINE	PRESET/MANUAL PROG
4	?EVACUATION? MEMORY	

The convergence data for the NORMAL SCAN mode and that for the UNDER SCAN mode are memorized in the separate memory so that the NORMAL SCAN adjustment and the UNDER SCAN adjustment should be performed separately. The convergence data in the memories No.1 and No.3 can be copied. The convergence data in the memories No.2 and No.4 can also be copied. The white balance data in the memories no.1 and No.2 or No.3 and No.4 can also be copied too.

Data Refresh

The data in each port can be lost due to discharge or due to external noise. The software is provided so that the data in the memories are re-written to each port during the vertical blanking period.

Digital Convergence



When the digital convergence mode is selected, the hatch pattern as shown in the illustration will come out. The most external surrounding lines are showing the effective picture area and the approx. 7% overscan area exists inside this effective picture area. However, this area reaches approx. 11% when only the horizontal direction is considered. This effective area has the crossing points of $13 \times 13 = 169$ points.

The memory of two addresses are assigned to each of 169 crossing points so that one address is used to memorize the vertical direction data while the other address memorizes the horizontal direction data. This memory is backed-up by the back-up battery located in the ZD board. The memory data indicating the cursor position is supplied from the N board in the FINE mode and the data is increased and decreased. In the ROUGH mode, the cursor position from no.1 through No.13 data is memorized in the separate EEPROM in the Zc board and the control is done from the Dc board.

The cursor positions from No.14 through No.25 provide multiple address data corresponding to the afore-mentioned ZD board memory that is increased and decreased with each address are weighted.

The general equation for this calculation is shown as follows.

$$D_{N1} = D_N \pm k f(x, y) \dots \text{equation-1}$$

$f(x, y)$: increase/decrease pattern corresponding to cursor position

D_{N1} : new data

N : old data

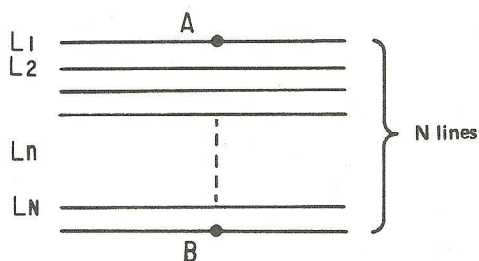
k : coefficient

In practice, the k in the above equation is increased/decreased to obtain each D_{N-1} . This calculation is done by the 16 bits. The result is obtained from the upper 8 bits so that the error is minimized.

The data D_N is memorized in the Z_D board RAM, but data k is memorized in the Z_C board EEPROM. Therefore, once adjustment is completed, the Z_C board and the Z_D board should be handled as a pair. But if the "MEMORY ALL RESET" is established, they can be handled separately.

The memory read-out is done by accessing memory together with beam scan so the read-out data is D/A converted, passed through LPF and is output as the correction waveform. There is area where data does not exist. The area between the hatch crossings in the vertical direction has no data. So, the linear interpolation from the data from the upper line and the lower line is utilized. For example, the A point and B point in the following Figure have the correction data. The area between A and B has the scanning lines as much as $N-1$ lines. Then the correction data D_N at the I_N position can be obtained from the following equation.

$$D_n = A + (B - A) \frac{n-1}{N} \dots \text{equation-2}$$



Method of interpolation

In practice, this calculation is performed by hardware circuit, as discussed in the Z_D board circuit description.

This is the method to make access to the data that are obtained as the beam scanning advances, and the correction waveform is provided. The previous data should be re-written during the adjustment proceeds. Therefore, the data that are obtained by the adjustment, are input during the vertical blanking period, by employing the interrupt function of CPU.

CIRCUIT DESCRIPTION REGARDING EACH CIRCUIT BOARD

N BOARD

The N board is consisted by the single chip micro-processor (IC5) that has built-in A/D convertor and a program memory (IC3).

The port is connected to the KEY matrix, LCD unit and LED serial I/O buffer. The +5V power is supplied from the 8-pin mini DIN connector.

The software has the programs as follows.

- (1) KEY data read-out and communication of the KEY command signal.
- (2) Aperture control data's A/D conversion.
- (3) Mode and function control.
- (4) LCD display control.

The software is reasonably made intelligent.

ZA BOARD

This board receives the commands from the Z_C board CPU and executes the following operations.

- (1) B_E board control (internal SG), and cursor generator.
- (2) Aperture data and white balance data's D/A conversion.

(1) Cursor generator

The H-HATCH, and V-HATCH signal data are counted by IC7 and IC16 respectively. The output data are compared with the cursor position data on the cursor position data port (IC24), by IC8, IC9, IC17, IC18. Only when these two data are of same value, these two data are delayed for 1/2 cycle, and are AND-gated so that the output pulses are obtained as the Cursor Pulse. IC1, IC2, IC3 count the vertical sync and are oscillating the Flashing gate pulse that switches ON/OFF the above mentioned cursor pulse.

This cursor pulse is gated by the control pulses such as CURSOR ENABLE and FLASH ENABLE of the SG CONTROL port (IC26).

The cursor pulse is finally sent as the INVERT signal during the flashing mode and is sent as the hatch's brightness control signal during the flashing mode, to the B_E board.

(2) Aperture and white balance data's D/A conversion

The IC29 through IC34 are the compact ICs that have the two channel D/A convertors with latch function, and operational amplifiers. These ICs receive various data from Z_C board CPU and convert them to the dc voltages ranging from 0V through 10V. They provide output to the following ten channels.

Bias (1st)	R.G.B	total 3 channels
Bias (2nd)	R.G.B	total 6 channels
Gain	R.G.B	total 3 channels
Aperture		1 channel

See the section on the CA board for details on bias and gain.

Z_C BOARD

This the famlier CPU board using Z80A family (IC3, IC14, IC15).

Memories are used as follows.

RAM	2K byte S-RAM
PROGRAM ROM	8K byte EP-ROM
DATA ROM	4K byte EEPROM

The serial interface SIO is IC14 that is connected to the RS422 driver/receiver (IC12, IC13).

Approximate 5 MHz clock signal is generated by the S-type TTL, that is divided by two so that 2.5 MHz clock is used. The ports (IC23, IC24, IC25) of this board provides the following functions.

- SET-UP (V. SIZE control)
- NORM/TEST control
- R.G.B. ON/OFF control
- Memory select control

Software of this CPU system receives command from N board and performs operation according to the commands. This is the main operation of this software. Other operations are respective ports initialization in the event of power on, refresh operation during the vertical blanking period and re-writing Z_D board RAMs, etc. The switch S2 is the NMI (non-maskable interrupt) switch that initializes all the memory data by software means. Therefore, take care of S2 operation. This initialization takes approx. 40 seconds and then the red LED (D4) is lit on, after that, LEDs (D5, D6) are lit on, showing that all initializations are completed.

The (ZC-2) setting pin can be connected either to A side or A side.

The Q2, Q3 circuit is to discharge the capacitor C5 in the event of power OFF so that the re-set circuit will operate correctly when the power is turned ON next time.

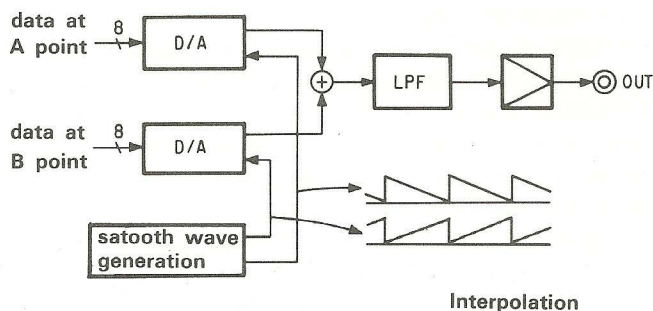
The IC7, IC8, IC9 circuit is the bus buffer that receives/transmits the various data between Z_A, Z_D, D_A, D_B, D_C ports and memories through the Z_M board mother board.

Z_D BOARD

The Z_D board has 8K byte S-RAM (IC13) to memorizes the digital convergence data. It receives power from normal 5V and back-up battery 3V. These 5V and 3V are OR gated by a diode. The address lines and the data lines are connected to the D/A circuit during the read-out mode and to the CPU circuit during the write-down mode (write-down is executed during the vertical blanking), which is done by IC3, IC14, IC15, IC16.

A certain point on the TV screen has the horizontal direction data and the vertical direction data. These horizontal and vertical direction data are read-out by the time division method, latched (IC20, IC22) to coincide timing, and then sent out to D/A (IC21, IC22) circuit.

The horizontal direction address data is obtained by counting the 8 bit data by IC10, IC11. This 8 bit data is produced by dividing the one horizontal data by 256 where the horizontal data is supplied from the dB board PLL circuit. At the same time, the vertical direction data is obtained by counting the horizontal rate pulse with the sequential counters IC1, IC2, IC6. The interpolation is then discussed, referring the following illustration.



Interpolation

The sawtooth wave whose one cycle is equal to the length of one vertical hatch pitch is provided as shown in the above illustration, in two polarities of positive polarity and negative polarity. These sawtooth waves of two polarities are produced by IC3, IC4, IC5, and are supplied to the reference voltage input terminal of the D/A converter circuit. These two 8 bit D/A conversions are amplitude modulated by the sawtooth waves, and the outputs are added so that the section 1-6 item equation-2 is fulfilled. Thus the memories are accessed and D/A converted so the appropriate correction waveforms are always generated.

UNIFORMITY CONTROL SIGNAL GENERATOR (Z_E BOARD)

Function

This circuit board generates the uniformity correction control signal for the respective G, B, R channels. The tv screen is divided into 27 vertically and into 55 horizontally. (The effective tv screen is divided into 28 vertically and into 51 horizontally.) Each section has the corresponding memory addresses respectively. The switch SW1 can select either one of 8 patterns.

Address buffer

The "n × fh" clock signal is input to buffer IC12, and then sent to the uniformity correction data memory (IC101, IC201, IC301) ROM's lower address. The 64 fh clock signal is used as the data time division clock.

Scanning Line Counter and ROW Counter

The 18 vertical scanning lines correspond to one memory. The horizontal drive pulse (HD) is inverted by IC1 (2/4), and is fed to IC4, IC5 as clock signal. The IC4, IC5 are the 18 scanning line counter whose output is routed to IC8 for vertical interpolation. When IC4, IC5 have completed the 18 counts of scanning line, IC1 (3/4) output reset pulse which resets the counter. This reset pulse becomes the clock for the ROW counter IC2, IC3.

These scanning line counter and the ROW counter are reset by the VD timing.

The vertical interpolation circuit consists of the data time division circuit and the D/A converter that has the weighting characteristics.

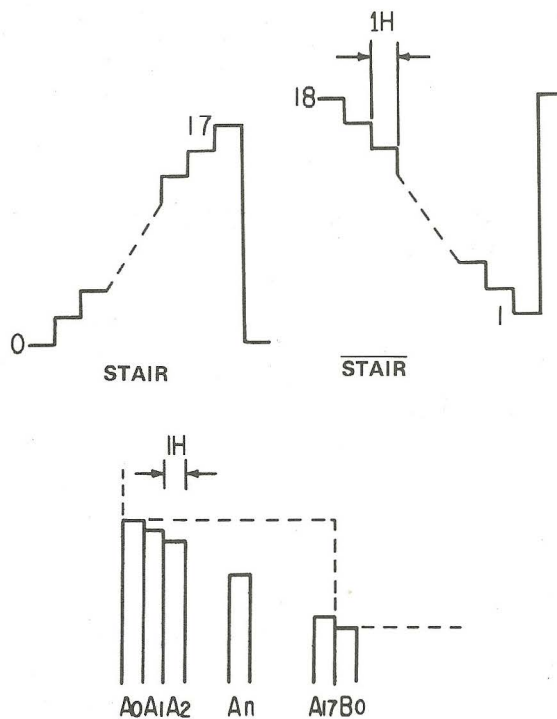
Data Time Division

The ROW counter output is input to the adder IC6/IC7, where 0 and 1 are fed alternately at $128 f_H$ rate. So, the ROW sends out the present address and the "present address +1" address (which is one row lower address on tv screen), alternately that become the upper address of the uniformity correction data memory ROM. Since the ROM output is time-divided, the present data is latched at the rise-up timing of the $64 f_H$, while the next data is latched at the fall-down timing. These two data are put into in-phase, and are routed to the multiplier type D/A convertor IC105/IC205/IC305.

* D/A Convertor having Weighting Characteristics

The scanning counter output IC4, IC5 is supplied to D/A convertor IC8 that generates the STAIR signal and the inverter $\overline{\text{STAIR}}$ signal.

These two stair signals are increasing and decreasing their amplitude at the rate of 18 scanning rate.



If the vertical direction data-Ao and data Bo are taken as example.

In order to establish the linear interpolation between data Ao and data Bo, the data corresponding to each scanning lines should be as follows.

$$A_0 = A_0 \times \frac{18}{18} + B_0 \times \frac{0}{18}$$

$$A_n = A_0 \times \frac{18-n}{18} + B_0 \times \frac{n}{18}$$

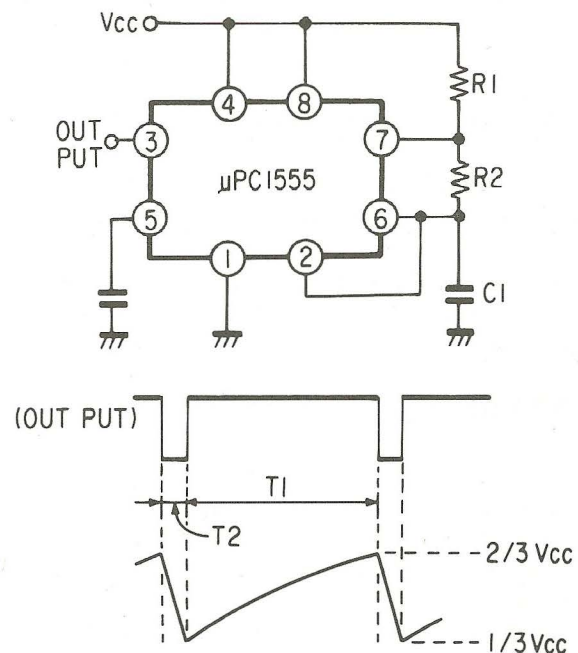
$$A_{17} = A_0 \times \frac{1}{18} + B_0 \times \frac{17}{18}$$

$\underbrace{\frac{18-n}{18}}_{\text{STAIR}}$
 $\underbrace{\frac{n}{18}}_{\text{STAIR}}$

The data Ao and Bo are digital value that are obtained by time division. The weighting is applied to the D/A converted output STAIR signal and to the inverted $\overline{\text{STAIR}}$ signal, that are supplied from the scanning line counter. The weighted current output from the multiplier type D/A convertor is added by the Io signal and the inverted $\overline{I_o}$ signal respectively. Their output is converted from electric current to the voltage signal by the differentiators IC107, IC207, IC307. Their outputs are the R-CONTROL, G-CONTROL, and B-CONTROL signals in both positive and negative polarity signals.

V. PULSE Oscillator (DA BOARD)

This oscillator is astable type oscillator using timer IC, reset by the vertical sync signal. The astable type oscillator is shown as follows.



As the $R_1 + R_2$ charging current flows into C_1 , the voltage across C_1 reaches the threshold level of the timer IC pin-⑥ ($2/3 \times V_{cc}$), its output pin-⑦ is turned on to discharge C_1 through R_2 . As discharging proceeds, the voltage across C_1 (trigger terminal pin-②) reaches down to $1/3 V_{cc}$, its output is turned OFF so that the charging C_1 through $R_1 + R_2$ starts. This operation is repeated to continue the astable operation. Formula of T_1 and T_2 are as follows.

$$T_1 = 0.693 (R_1 + R_2) C_1$$

$$T_2 = 0.693 R_2 C_1$$

Present value of R_1 is $47 \text{ k}\Omega + 100 \text{ k}\Omega$, R_2 is $1.8 \text{ k}\Omega$ and C_1 is 0.22, therefore, T_1 and T_2 are calculated as follows.

$$T_{1(\text{MAX})} = 0.673 \{ (47 \text{ k} + 100 \text{ k}) + 1.8 \text{ k} \} \times 0.22 \times 10^{-6} (\text{S})$$

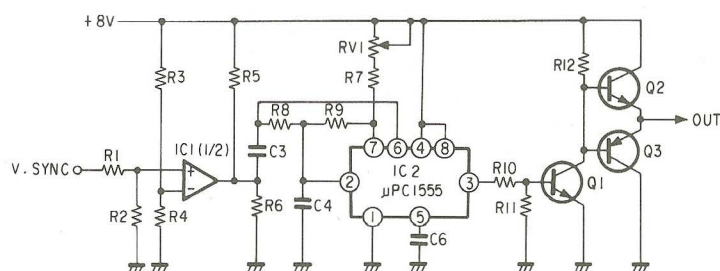
$$= 22.68 \text{ ms} \approx 44 \text{ Hz}$$

$$T_{1(\text{MIN})} = 0.693 \{ (47 \text{ k} + 0) + 1.8 \text{ k} \} \times 0.22 \times 10^{-6} (\text{S})$$

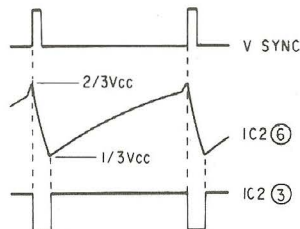
$$= 7.44 \text{ ms} \approx 134 \text{ Hz}$$

$$T_2 = 0.693 \times 1.8 \text{ k} \times 0.22 \times 10^{-6} (\text{S}) = 0.27 \text{ ms}$$

The vertical pulse's retrace period is 0.27 msec so that the vertical oscillator variable width range is from 44 Hz to 134 Hz. This oscillator is locked to the vertical sync by applying the vertical sync differentiated pulse of C1 potential, that pulls up potential to the $\frac{2}{3} \times V_{cc}$ level forcibly to reset this oscillator. Actual circuit is shown as follows.

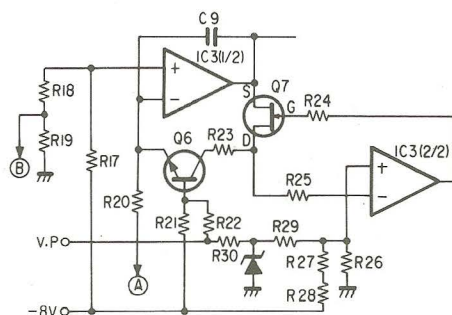


The vertical sync signal is input from the BN board with 12 Vp-p, divided by R1, R2, and is sent to comparator IC1 (1/2) where it is compared with the other input from R3, R4 potential ($\frac{1}{2} V_{cc}$) so that the vertical sync input is wave-shaped. This output is differentiated by C3, R8 and is then input to IC2- ⑥ pin. The resistor R1 in the illustration's circuit means $R_{V1} + R_7$, the resistor R2 means R9 and C1 means C4. IC2- ③ pin output is inverted by Q1, buffered by Q2, Q3 to provide output.



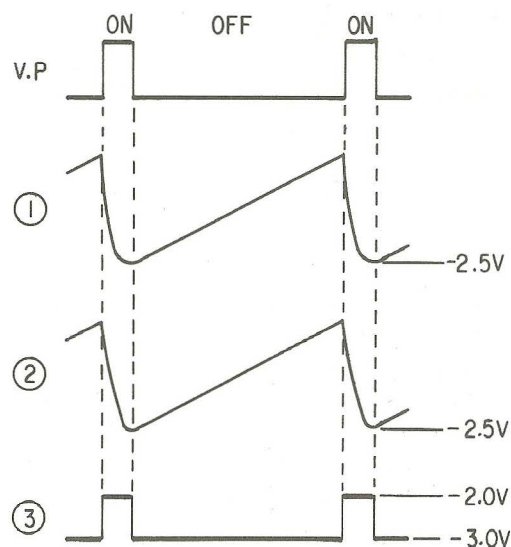
VERTICAL SAWTOOTH-WAVE GENERATOR (DA BOARD)

This vertical sawtooth generator comprises the sawtooth generator circuit and frequency detect circuit. The sawtooth generator is shown as follows.



IC3 (1/2)'s positive terminal is biased to $-2.5V$ dc by R17, R18, R19. The sawtooth is generated by a Miller integrator of R20, C9. This Miller integrator output is increasing linearly during when Q6 is OFF (scanning period).

When Q6 is turned ON (blanking period), Q7's source-drain circuit is shorted so that the output voltage is sharply decreased as shown in the following illustration (1), with the C9, R23 time constant, until $-2.5V$.

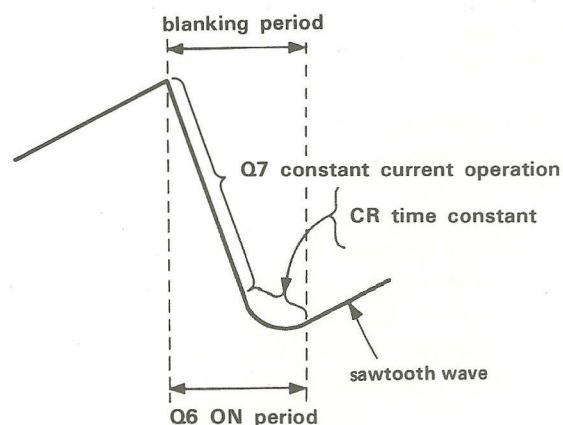


If this output signal is directly input to the V. OUT, a sharp ($V_p = -L \times \frac{di}{dt}$). The high amplitude blanking pulse causes on V.OUT saturation and also ringing. To prevent the ringing, the wave-form is changed into the signal that is shown as (2) in the illustration.

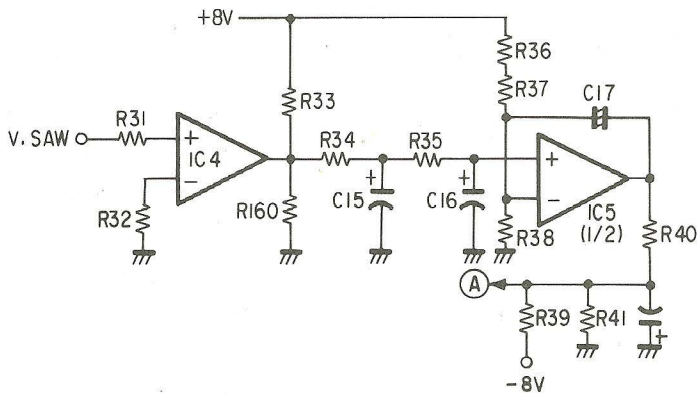
This wave-form change is done by the following circuit operation. As Q6 is turned ON, its collector voltage becomes $-2.2V$ ($-2.5V + 0.3V V_{ce}$) that is routed through R23, R25, and then to IC3 2/2's - negative input. Its positive input receives the signal shown as (3) in the illustration that is the vertical pulse after clipped by R30, D1, and after biased by R26, R27, R28, R29. The FET Q7's impedance is controlled by IC3 (2/2) until Q7 drain reaches $-2.0V$.

Then the voltage across R23 becomes $-2.2V - (-2.0V)$ so that the constant current operation is started. As C9 voltage is decreased, Q7 is turned ON to realize C9, R23 curve.

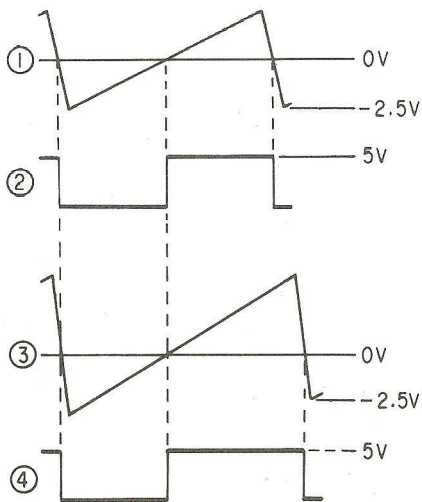
The above explanation is shown as follows.



The frequency detector circuit is discussed as follows.



The sawtooth wave that is generated by the afore-mentioned sawtooth wave generator circuit, (shown in the following illustration) is passed through R31 and is input to IC4 (μPC311C) zero-cross comparator where sawtooth signal is formed into rectangular wave as shown below. This rectangular wave is converted into dc voltage by the integrator circuit of R34, C15 and R35, C16. If the following wave form is 50/50, the dc voltage becomes 2.5V.



IC5 (1/2)'s \ominus terminal is biased to 2.5V by R36, R38 while its output terminal is biased to \ominus potential by R39, R40, R41, and is connected to the point (A) of the afore-mentioned sawtooth wave generator circuit. If the point (A) potential is increased, the voltage across R20 becomes small that reduces C9 integrating current, and reducing the sawtooth wave amplitude small.

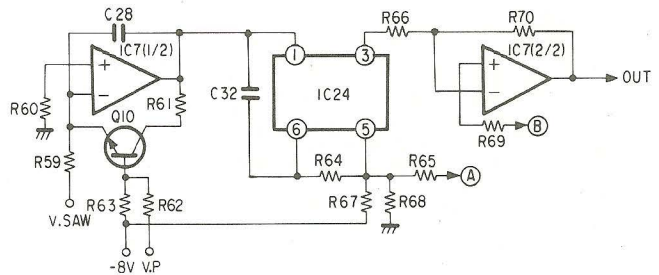
If the low frequency sawtooth signal is input, the IC4 output loses 50/50 duty cycle that results in increase of integrator output.

Then the IC5 (1/2) output voltage is increased which increases the point (A), decreasing the sawtooth signal's amplitude. Then the waveform re-gains 50/50 duty cycle so that entire circuit's operation is stabilized.

This circuit operates so that the comparator output should have 50/50 duty cycle where the sawtooth signal amplitude is determined by R17, R18, R19 (negative signal area) and R36, R37, R39 (positive signal area).

VERTICAL PARABOLIC SIGNAL GENERATOR (DA BOARD)

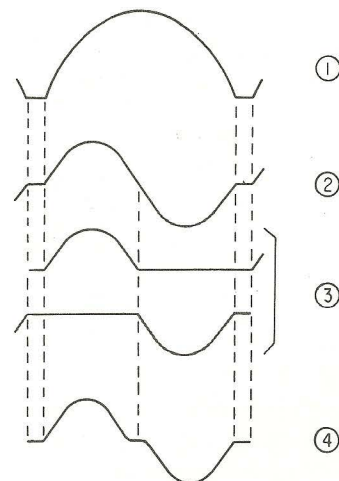
Since this circuit has the zero-clamp function and the peak-clamp function, its output signal's amplitude is not affected by frequency change.



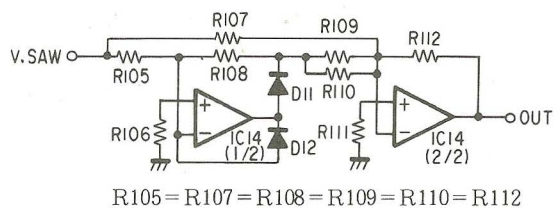
IC7 (1/2) and Q10 are generating the parabolic signal. Since this circuit is of common Miller integrator, explanation is omitted. IC24 is a MOS FET that is functioning as the voltage-controlled variable resistor. Its resistance value between pin-① to pin-③ can be controlled by the dc voltage that is applied to pin-⑤. The point (A) in the illustration is receiving the peak-clamp controlling voltage that is supplied from IC8 (1/2). The point (B) in the illustration is receiving the zero-clamp controlling voltage that is supplied from IC8 (2/2). The clamp pulse for the peak-clamp operation is the vertical pulse as it is. The clamp pulse for the zero-clamp is obtained by differentiating the sawtooth generator's frequency detector circuit's rectangular output which is the rise-up pulse.

VERTICAL SINUSOIDAL WAVE GENERATOR (DA BOARD)

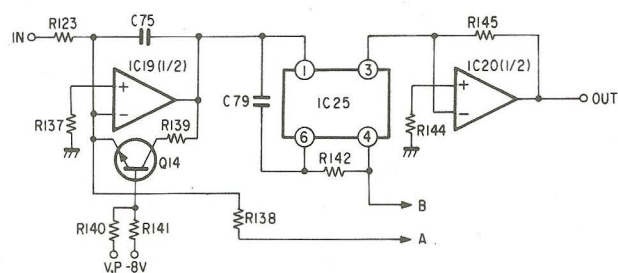
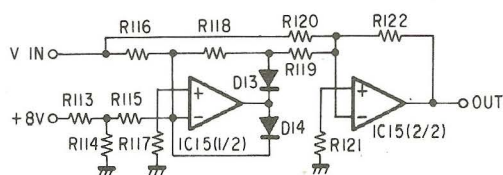
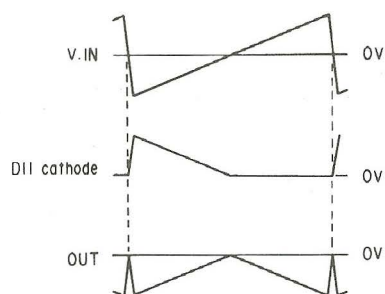
Sinusoidal wave (② in the following illustration) can be obtained by integrating a parabolic signal (① in the following illustration) in general. But if the parabolic signal is divided into two, as shown in ③ of the illustration, a horizontal bar will be the result on monitor screen. In order to prevent the horizontal bar, the sinusoidal signal shown as ④ in the illustration should be prepared. This signal cannot be obtained by integrating the parabolic wave. This equipment has the circuit design to produce the signal shown as ④ in the illustration.



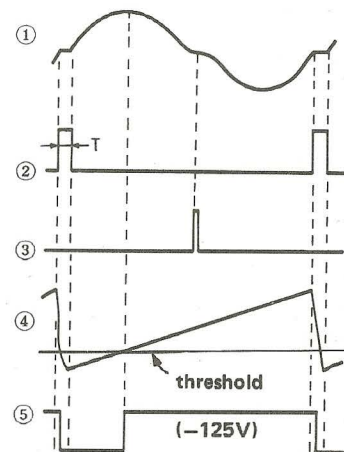
The circuit shown is a common full-wave rectifier circuit. Sawtooth wave signal is supplied to its input. When $D11$ $V_{IN} \leq 0$, $-R108/R105 \times V_{IN}$ is established. If $V_{IN} > 0$, $D11$ is turned off to 0.



This output signal and the V_{IN} are current-mixed by IC14 (2/2) through $R109/R110$ and $R107$, the signal shown as follows is obtained. This output is again input to a full-wave rectifier as shown below. Since the input of this circuit is dc-biased by $R113$, $R114$, $R115$, the sawtooth signal's center is rectified as shown in the following illustration. Output of this circuit is again input to the IN terminal of the circuit as shown.

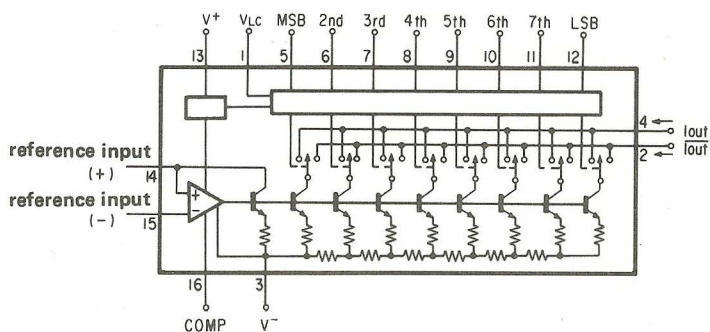


IC193 and Q14 form a Miller integrator where the IN signal is integrated. The zero clamp pulse (same signal as used in the parabolic signal zero clamping) is input to (A) from IC21 (1/2) providing the clamping control voltage, shown as (3) in the illustration. Signals (4) and (5) in the illustration are showing the timing chart of the clamp pulse for the peak-clamping. The threshold voltage shown as (4), is obtained from the (B) center point between $R18$, $R19$ bias resistors of $-2.5V$ as described in the vertical sawtooth generator circuit. This threshold voltage and the sawtooth wave signal are input to the comparator and the signal shown as (5) in the illustration is obtained. Its differentiated pulse's rise-up edge is formed into pulse by IC9 (4/4) so that its output pulse is used as the clamp pulse. The control voltage is input to point (B) from IC21 (2/2).



Waveform Dividing Circuit

The waveform division is done by using the multiplier type D/A converter. The D/A converter circuit is shown in the following illustration where the reference input current value is divided equally by 256 from MSB data to LSB data so produce the I_{out} output signal. If 2 mA current is introduced to the reference input \oplus , while the reference inputs \ominus are imagine-short-circuited, and the data are FF (8 lines from MSB to LSB are all HIGH), following results are obtained.



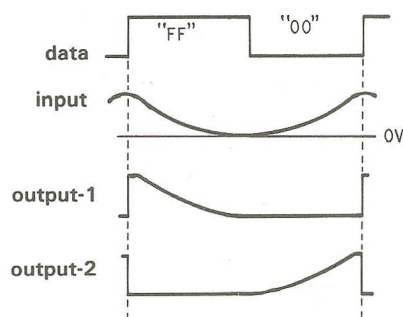
$$I_o = 2mA \times \frac{255}{256} = 1.992mA, \quad \bar{I}_o = 2mA \times \frac{0}{256} = 0mA \text{ となる。}$$

If data are set to "00", the following results are obtained.

$$I_o = 2 \text{ mA} \times \frac{0}{256} = 0 \text{ mA}, \quad I_o = 2 \text{ mA} \times \frac{255}{256} = 1.992 \text{ mA}$$

Nextly, the principle to divide the parabolic signal is explained as follows.

This division is realized by the D/A converter of IC11, IC13 and operational amplifier of IC12. The vertical parabolic signal input flows the parabolic current into the D/A converter (IC11, IC13)'s reference input \oplus (pin ⑭), through R97, R101.



Since the input signal current is \oplus , it is connected to the \oplus input terminal. After data lines of D0 through D7 (from pin- ⑤ through pin- ⑫) are connected, the rectangular wave signal that is produced from the vertical sawtooth signal, is input through Q13.

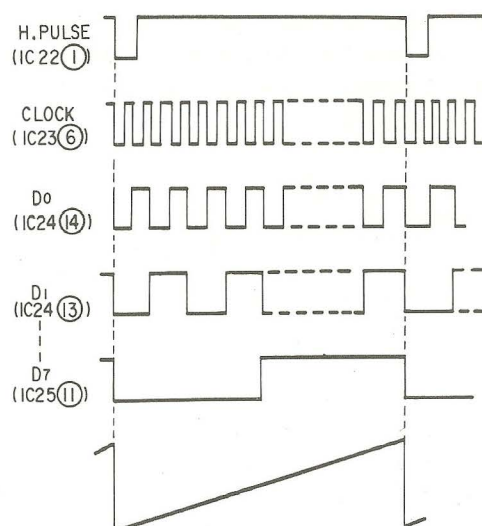
As long as the data are "FF", the IC13's output current (pin- ④) is converted to voltage by IC12 (2/2), so that the output "1" waveform is obtained. While the data are "00", the IC11 output current (pin- ②) is converted into voltage by IC12 (1/2) so that the output "2" is obtained.

This is the method to divide the parabolic wave signal into two parts.

Regarding the sinusoidal wave signal, the right half of the signal (that is the lower half of screen) is the negative voltage, so that the input to the D/A converter is fed to the \ominus terminal (pin- ⑮) of IC16. The rest of operation is identical to that of parabolic dividing circuit operation.

PLL (DB BOARD)

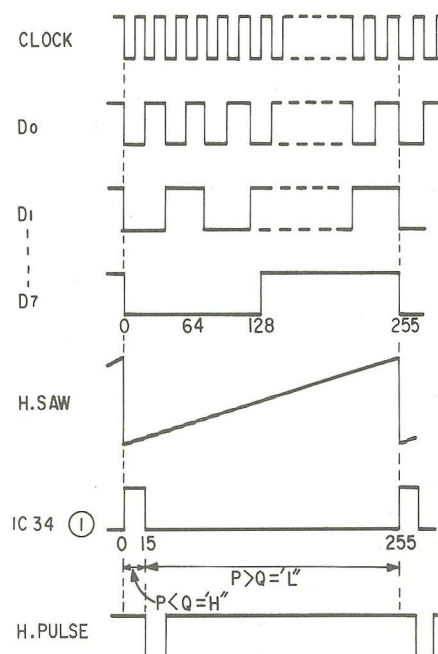
The horizontal rate correction waveform and modulation waveform are generated in this board. All the horizontal rate waveforms are generated by all digital circuits



The PLL is used to synchronize the horizontal deflection and the horizontal correction signal. The horizontal pulse is input from the horizontal deflection into IC22- ① pin. The clock signal is obtained from IC23- ⑥ pin and it drives the IC24, IC25 counter. The output MSB from IC25- ⑪ pin is returned to IC22- ③ pin. The synchronization between the horizontal pulse and the counter is thus established. The horizontal sawtooth signal is obtained by feeding the counter's output 8 bit to the D/A converter input.

This horizontal sawtooth correction signal is amplified and then supplying correction current through the SUB DY so that the registration is corrected. However, the correction signal is phase-delayed with this relationship between the horizontal pulse and horizontal sawtooth. Therefore, this correction signal is phase-advanced by IC34, SW4. The IC34 is called as 8 bit MAGNITUDE COMPARATORS that has two 8-bit inputs of P and Q.

The inputs P and Q are compared. If $P > Q$ is input, pin- 1 is set "L". The P input receives the counter's output in the DB board, while the Q input is preset by SW4.

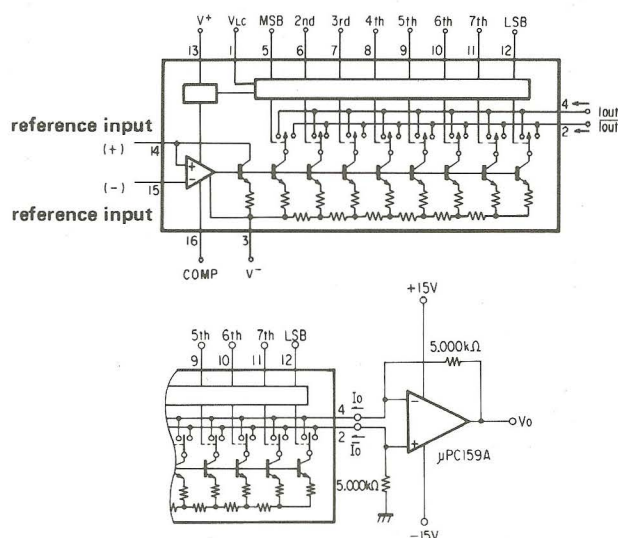


The present range is from 0 through 15. If preset is set to "15", the IC34-① pin will have the signal as in the illustration. Since this PLL synchronizes at the fall-down edge, the horizontal pulse becomes as shown in the illustration, showing that the horizontal sawtooth signal advances to the horizontal pulse. This preset value of "2" is appropriate in the HDVS.

HORIZONTAL SAWTOOTH WAVE GENERATOR (DB BOARD)

The principle to generate sawtooth wave signal by connecting counter output into D/A converter.

The D/A converter block diagram is shown. The reference input \ominus terminal is imaginage-short-circuited while the reference input \oplus terminal is connected to the reference voltage source through resistor. If the reference voltage of 10V is connected to input through 5k ohms, the 2mA IREF flows, the output I_{OUT} and the inverted \bar{I}_{OUT} will change according to the 8-bit data inputs, as shown.



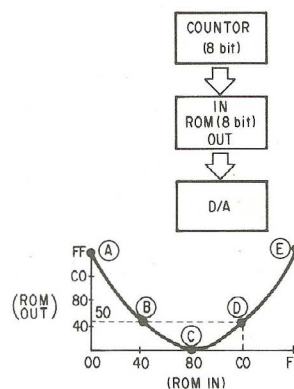
	MSB	2nd	3rd	4th	5th	6th	7th	LSB	I_O (mA)	\bar{I}_O (mA)
Full Scale	1	1	1	1	1	1	1	1	1.992	0.000
Full Scale -1LSB	1	1	1	1	1	1	1	0	1.982	0.008
Half Scale +1LSB	1	0	0	0	0	0	0	1	1.008	0.984
Half Scale	1	0	0	0	0	0	0	0	1.000	0.992
Half Scale -1LSB	0	1	1	1	1	1	1	1	0.992	1.000
Zero Scale +1LSB	0	0	0	0	0	0	0	1	0.008	1.982
Zero Scale	0	0	0	0	0	0	0	0	0.000	1.992

The 8-bit output from the counter is "0" (00) at the beginning of scanning, is "128" (80) at the center of scanning, and is "255" (FF) at the end of scanning. The output I_O and the inverted output \bar{I}_O will change from MAX to MIN and from MIN to MAX, respectively. After this current output is converted from current into voltage, the output sawtooth is obtained.

Horizontal Parabolic Signal Generator (DB Board)

Using the same principle as the generation of sawtooth signal, as discussed in the previous paragraph, the 8-bit output from counter is fed to D/A converter to generate analog signals. But, the parabolic signal, sinusoidal signal and desired signals can be generated by inserting ROM in between the 8-bit counter output and the D/A converter input. ROM data are shown.

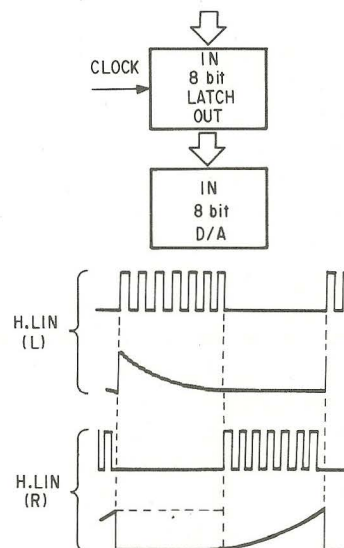
IN	OUT	position in the illustration
00	FF	(A)
40	approximately 5.0	(B)
80	00	(C)
CC	approximately 5.0	(D)
FF	FF	(E)



The typical five points are described, but 256 data are input in practice such as 00,01,02, ..., FD,FE,FF so that (A) to (B) to (C) to (D) to (E) so on are made smooth.

CP2005S

The type PC624C D/A converter is used only in the horizontal sawtooth generation. Other signals such horizontal parabola, horizontal sinusoidal and the division signals are generated by using the type CP2005S IC.



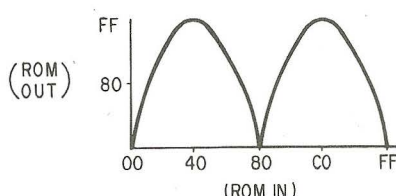
The detailed explanation is made in the DC board circuit description, but the operating principle is as follows.

As the block diagram of principle is showing, the u-bit data are connected to the latch and then to the D/A converter. The clock signal is required for the 8-bit word, but the clock signal is divided into left half and right half as shown in the illustration. In producing the horizontal linearity signal (left), the left side output has the sawtooth output because of existence of clock input, but the left half of the output becomes "00"=0V, because the clock input for the left half is "00".

The right half of the screen has small change. Since clock input is existing in the right half, the D/A output will provides sawtooth output in the right half. There is no difference so far. But the last clock's data is "FF", not "00", so that the high "FF" output will continue as shown by the dotted line in the illustration. In order to prevent this continued high output, the ROM data is changed. Reminding the afore-mentioned horizontal parabolic signal generator's explanation, the ROM input of "FF" will produce the ROM output of "FF", but in this circuit only, the ROM's "FF" input will produce the ROM's output of "00". So the last clock data will produce output of "00", as shown in the solid line in the illustration.

HORIZONTAL SINUSOIDAL WAVEFORM GENERATOR (DB BOARD)

This generator can be made by using the ROM that has the data content as shown below, in the circuit as discussed in the horizontal linearity signal generator.



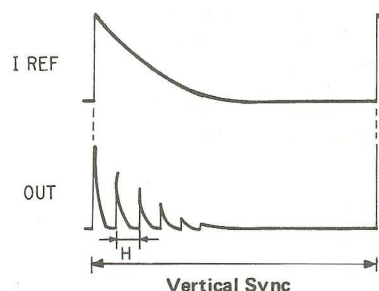
Modulation Signal Waveform

The signal shown in the following illustration is the correction waveform to be applied to the left-top of screen.

In the case of the horizontal parabolic generator, the I_{REF} is input from the high precision reference voltage source through a resistor, functioning as the dc current. This I_{REF} determines the signal amplitude of the horizontal parabola. The modulation waveform is generated by using this principle of I_{REF} .

If the vertical parabola (top) (left), is input in place of the high precision reference voltage, the I_{REF} signal becomes the vertical parabola (top) current. As this output I_{REF} is input to the horizontal linearity (left) signal generating circuit, the output as shown in the illustration is obtained. The screen's top right correction signal is generated from the vertical parabola (top)'s I_{REF} and the horizontal linearity (right) signal. The bottom left correction signal is generated from the vertical parabola (bottom)'s I_{REF} and the horizontal linearity (left) signals. The

screen's right bottom correction signal is generated from the vertical parabola (bottom)'s IREF and the horizontal linearity (right) signals.



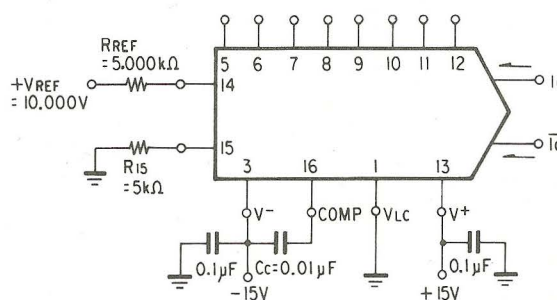
DC BOARD

The correction signals that are generated by the DA, DB boards are controlled by the CPU regarding their amplitude and polarity. The CP2005S type IC is used. This is a hybrid IC packaged in plastic mold. The circuit is shown in the following illustration.

This IC has two sets of the pair of 8-bit D/A converter and 8-bit latch. The D/A converter is already explained in the D_A, D_B board already, but repeat a bit again. If 10V dc is applied as the V_{REF}' and 5k ohms are used as the R_{REF} (reference resistor), the I_{REF} (reference current) becomes as follows.

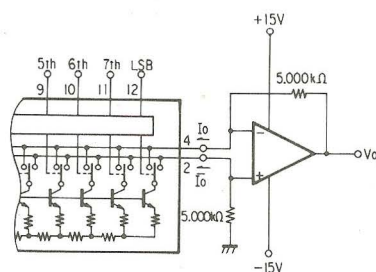
$$\frac{V_{REF}}{V_{REF}} = 10/5 \times 10^3 = 2 \text{ mA}$$

The $I_0 + \text{inverted } \overline{I_0}$ becomes $I_{\text{REF}} \times 255/256$. The ratio of $\overline{I_0}$ and the inverted I_0 can be changed by the data input.



If the parabolic voltage as shown below is input while R_{REF} is 4.7k ohms, approx. Approx 1mA parabolic current.

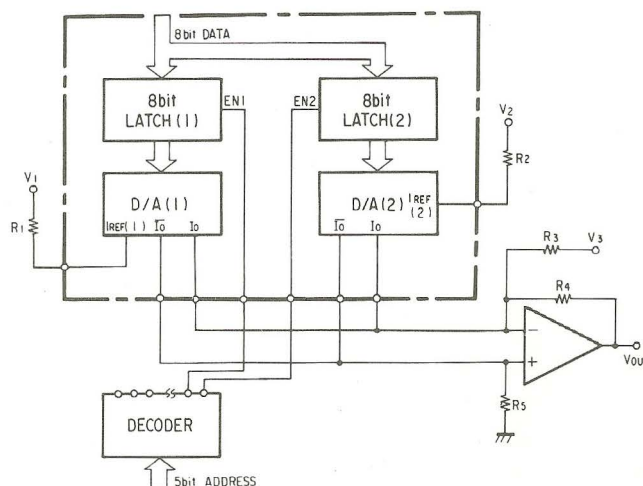
$$I_{REF} = \frac{V_{REF}}{R_1} = 5/4.7 \text{ k}\Omega = 1.06 \text{ mA}$$


$$\begin{cases} I_o = \frac{255}{256} \times 1.06 \text{ mA} & p-p = 1.056 \text{ mA} \\ I_o = \frac{0}{256} \times 1.06 \text{ mA} & p-p = 0 \text{ mA} \end{cases}$$
$$\begin{cases} I_o = \frac{0}{256} \times 1.06 \text{ mA} = 0 \text{ mA} \\ I_o = \frac{255}{256} \times 1.06 \text{ mA} = 1.056 \text{ mA} \end{cases}$$

If the input data are “80”,

$$\begin{cases} I_o = \frac{128}{256} \times 1.06 \text{ mA} = 0.53 \text{ mA} \\ I_o = \frac{127}{256} \times 1.06 \text{ mA} = 0.526 \text{ mA} \end{cases}$$

As discussed already, the amplitude and polarity of the correction waveform can be adjusted by the input digital data. The IC type CP2005S has two sets of the pair of the aforementioned D/A convertor and 8-bit latch. The block diagram is shown.



The 5-bit address from the CPU determines the location and the 8-bit data from the CPU too determines data. Therefore, the 5-bit address and the 8-bit data from the CPU drives the latch that is corresponding to the point to be adjusted on monitor screen, and change the data. If the latch-(1) shown in the last illustration is driven, the D/A convertor-(1) data is changed so that the correction signal of V1 becomes I_{REF} by R1 and is output to V_{OUT} . The maximum output voltage is determined by the R1 resistor's value, if V1 is of fixed value.

If the latch-(2) address is designated by the CPU, the D/A convertor-(2) driven so that the V2 correction waveform can be adjusted. These two correction waveforms of V1 and V2 are connected directly to respective D/A convertor's I_O and \bar{I}_O , so that they are current-added and then fed to operational amplifier where current is converted into voltage.

In practice, the numbers of D/As that is equal to the number of correction points are connected, and all I_O s and inverted I_O s are connected in parallel.

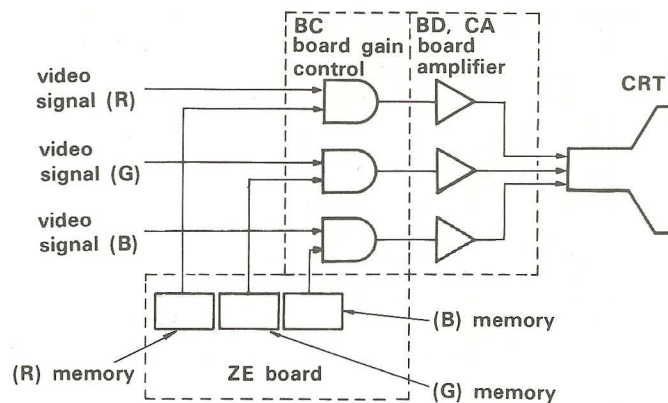
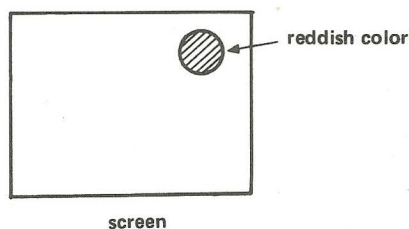
The V3 correction waveform shows the connection method when the correction value is of fixed value, or the correction value is already obtained in the separate circuit so that the correction value is added here.

In this case, the correction value is determined by R3, and the parallel values of R3, R4 should be of R5 value.

Principle of Uniformity Correction

If a certain point of the CRT shows reddish color, color of this point can be of same color as other points by adjusting the the red channel video signal's amplitude only at this point.

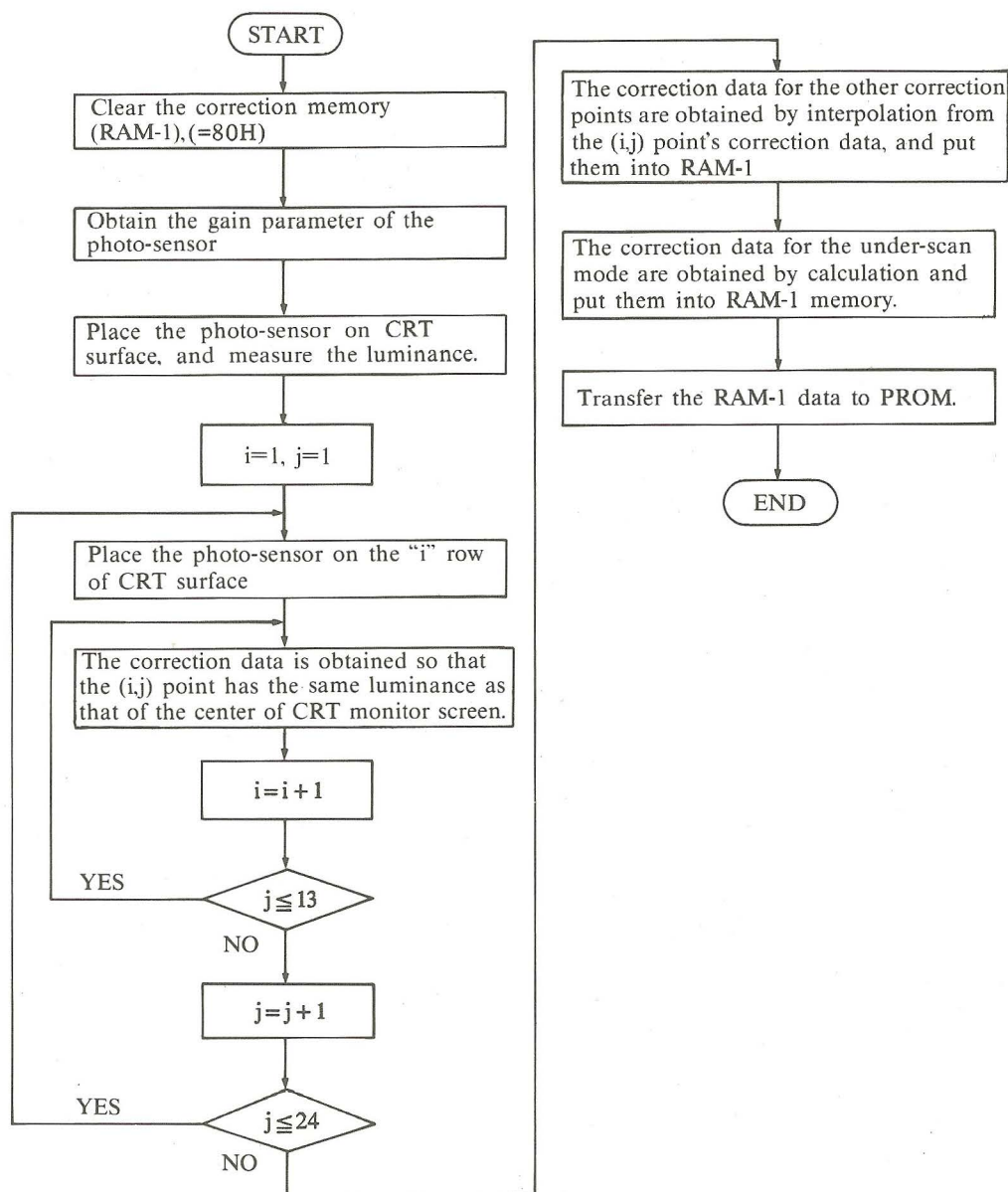
Therefore, the monitor screen is divided into numerous point, and the R,G,B correction data that are corresponding to each picture element are memorized in each memories. In synchronizing with the scanning, the data are read-out from these memories. These output data are used as the correction signals to be used for each channel's gain control. The video signal amplitude can be dynamically adjusted.



The correction data can be obtained by placing photo diode on the specific point of CRT, measuring luminance, and changing the memories' data.

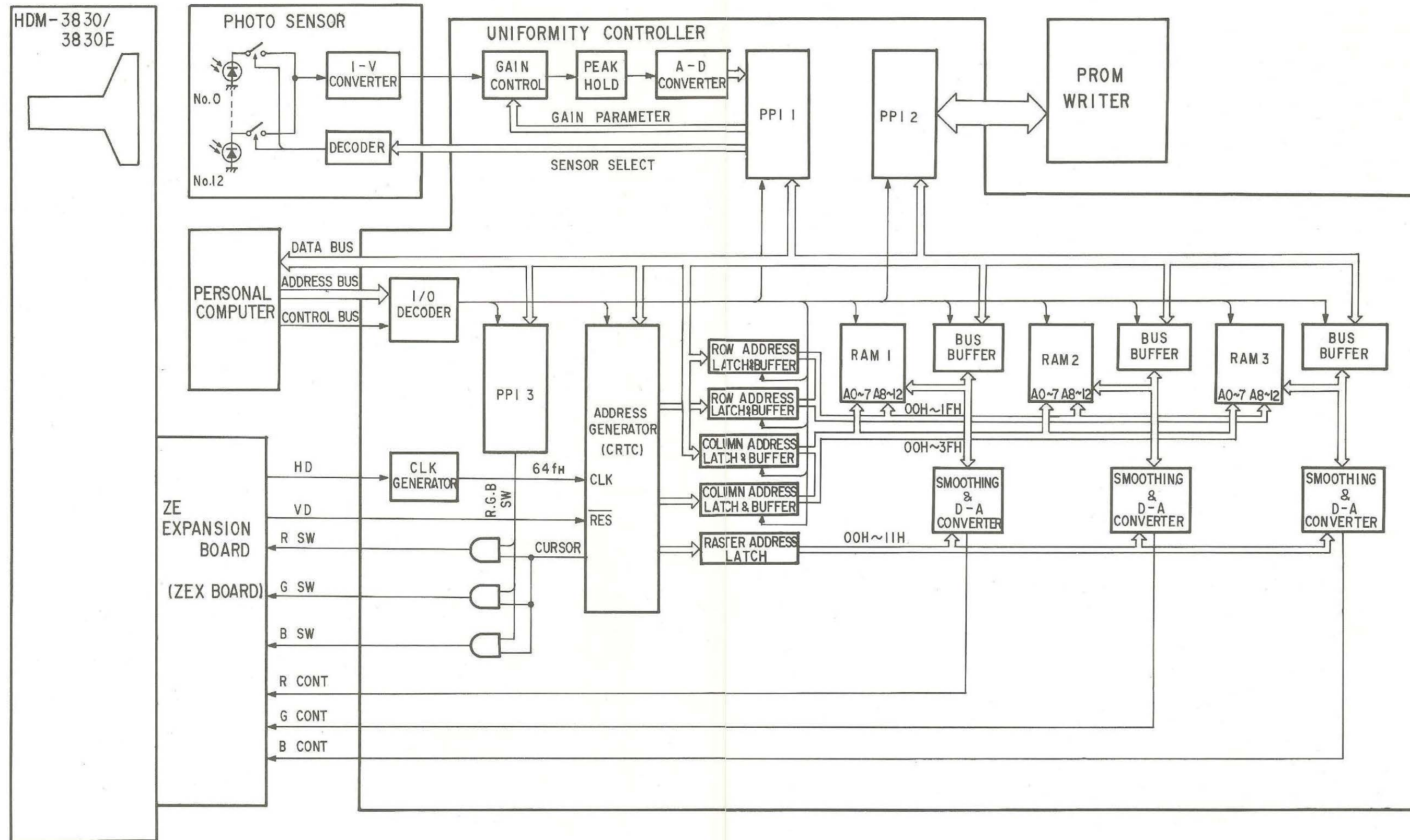
Uniformity Controller

The uniformity controller is the jit to be used for making the uniformity correction data. The block diagram and the flow chart are shown in the illustrations. The photo-sensor is made of 13 pieces of photo-diodes, current-to-voltage convertor and analog switch. The measuring points are as many as 13 points vertically by 24 points horizontally. The vertical 13 points are measured simultaneously by the 13 photo-diodes. The correction points are as many as 27 points vertically by 55 points horizontally. The data for the other points than the measuring points on monitor screen, are generated by the interpolation method between the surrounding measuring points' data. It will be discussed later.





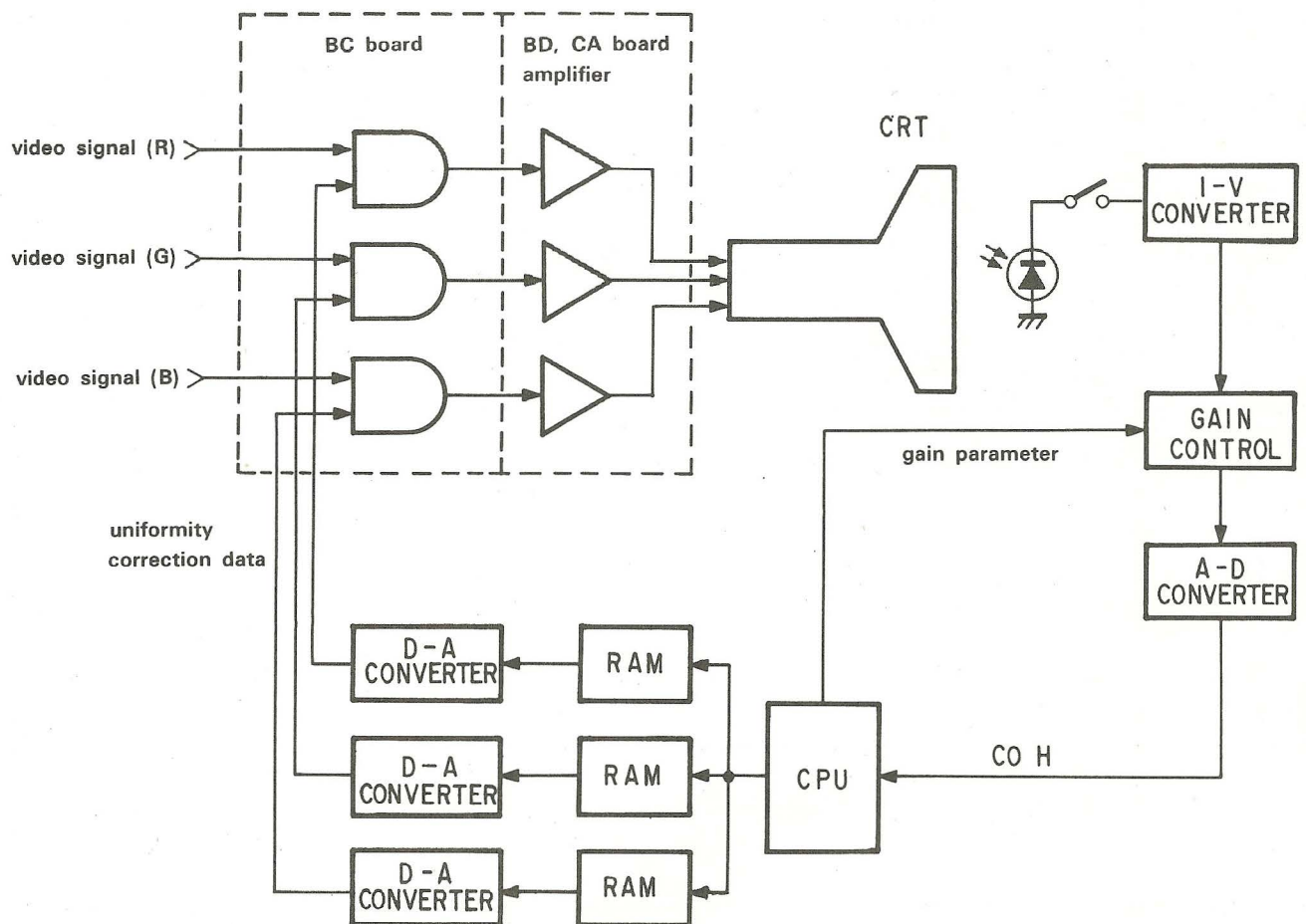
3. CIRCUIT DESCRIPTION



Method to Obtain the Gain Parameter

In order to shorten the measuring time, the 13 pieces of photo diode are located vertically so that vertical one row is measured at once. However, 13 pieces of photo diode have different sensitivity and have also different sensitivity to G, B, R colors that necessitates correction for sensitivity. This correction value is the gain parameter. This correction is performed by changing the digital input value to the gain control.

The method to obtain the gain parameter is discussed as follows. The CRT screen is set to display a single color. Place the sensor No.0 at the center of screen. Calibrate the gain control so that the luminance data (input to PP11) under this condition, has a constant value (COH for example). Transfer this gain control data obtained (gain parameter), to memory. Obtain the gain parameter regarding to the other two colors. Obtain the gain parameter of other 12 pieces of sensors by placing them at the center of screen, each by each, in the same manner as the no.0 sensor's procedure. Therefore, total 13 sensors have each 3 gain parameters for G, B, R respectively.



Method to Obtain Uniformity Correction Data

The uniformity correction data are the values that each points of CRT may have the same brightness as that of the center of screen.

Therefore, the brightness at the center of screen is measured by sensor, and the measured data are transferred to personal computer.

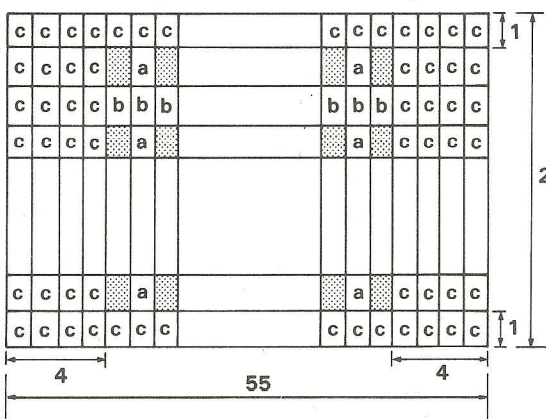
The correction data are obtained as follows.

In measuring the correction data at the top-left of screen, for example, the red channel correction data are obtained first. At this time, the sensor No.0 is accessed by the personal computer via uniformity controller's PPI-1 (Programmable Peripheral Interface). The sensor No.0 red channel gain parameter is transferred to the gain control. The G, B, R switching signal is sent to the BC board of HDM 3830/3830E so that the screen displays uniform red color only. As placing the sensor No.0 at the top-left of the screen, the brightness data at this point is transferred to the personal computer. The personal computer output the rec control signal so that the brightness at this point becomes equal to that at the center of screen. The red channel brightness data that is obtained when the both brightness data becomes equal, is the red channel uniformity correction data that is housed in the RAM-1. The correction data for green and blue channels are obtained in the same manner and are housed in the RAM-2/3 respectively.

The left most vertical one line is accessed and all the correction data for each point of vertical line are obtained by the sensors No.1 through No.12. By repeating this operation 24 times, all the correction data for all the points of vertical 13 by horizontal 24 points, are obtained.

Data Interpolation

The correction data for each measuring points of vertical 13 by horizontal 24 points are thus obtained. But the uniformity correction becomes rough due to insufficient numbers of data. So the correction data of vertical 27 by horizontal 55 points' data are calculated and are used.



The data that is obtained by measurement.
(13 × 24 points)

- The data that is obtained by averaging the left measuring point and right measuring point.
- The data that is obtained by averaging the upper measuring data and the lower measuring data.
- The outer circumference data are same as that of most outer data.

ROM'S MEMORY MAP

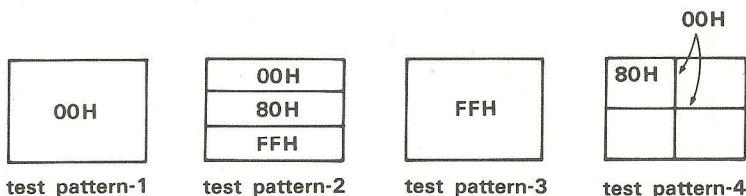
The uniformity correction data are housed in ROM. The ROM is installed in the ZE board that control the BC board's gain control.

Relation between the ROM data and the gain of the gaincontrol is shown as follows.

data	gain
00H	MIN.
80H	0dB
FFH	MAX.

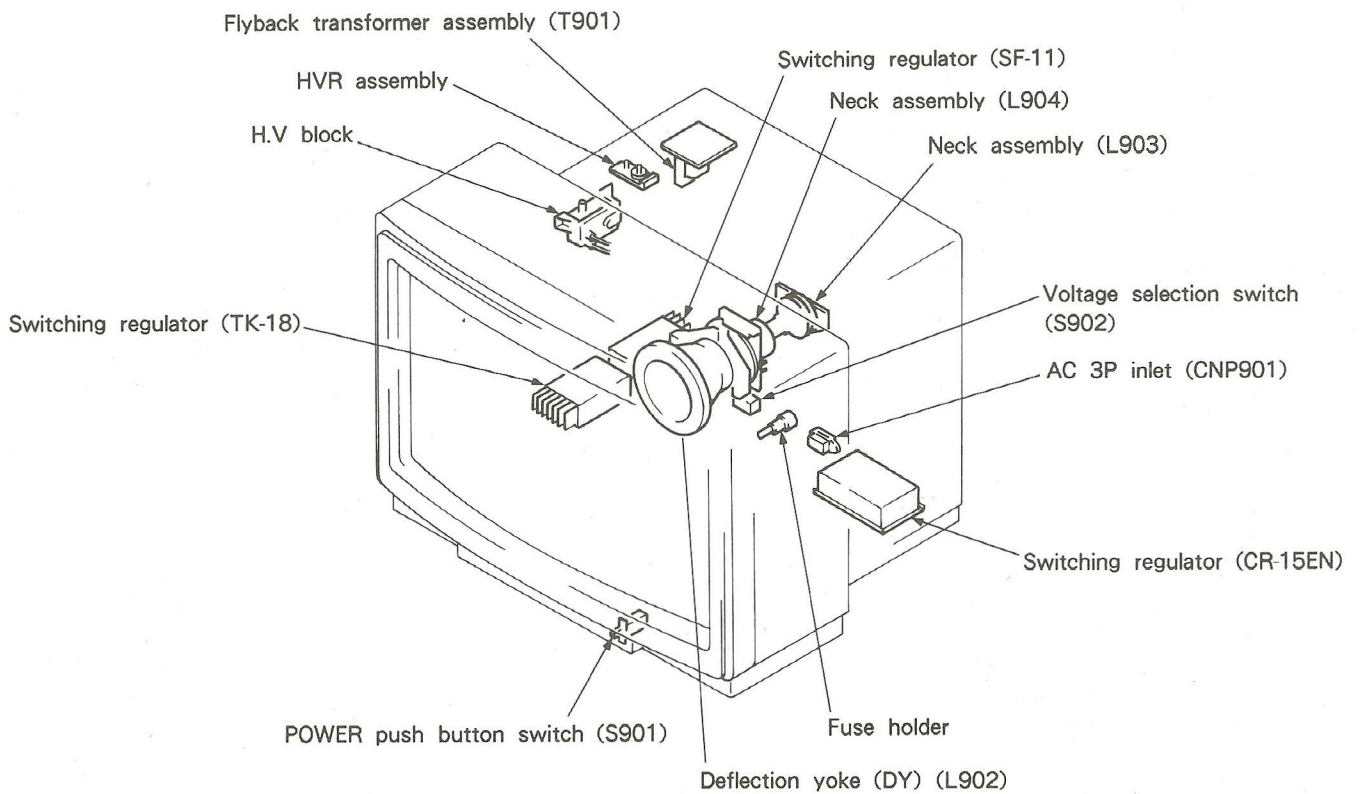
The ROM's memory map is shown as follows. The selection from position 0 through 7 is done by the switch SW1 on the ZE board.

position	address	content of data
0	0000H~0800H	uniformity correction data (normal scan)
1	1000H~1800H	test pattern-1 (normal scan)
2	2000H~2800H	test pattern-2 (normal scan)
3	3000H~3800H	test pattern-3 (normal scan)
4	4000H~4800H	test pattern-4 (normal scan)
5	5000H~5800H	undefined
6	6000H~6800H	undefined
7	7000H~7800H	undefined

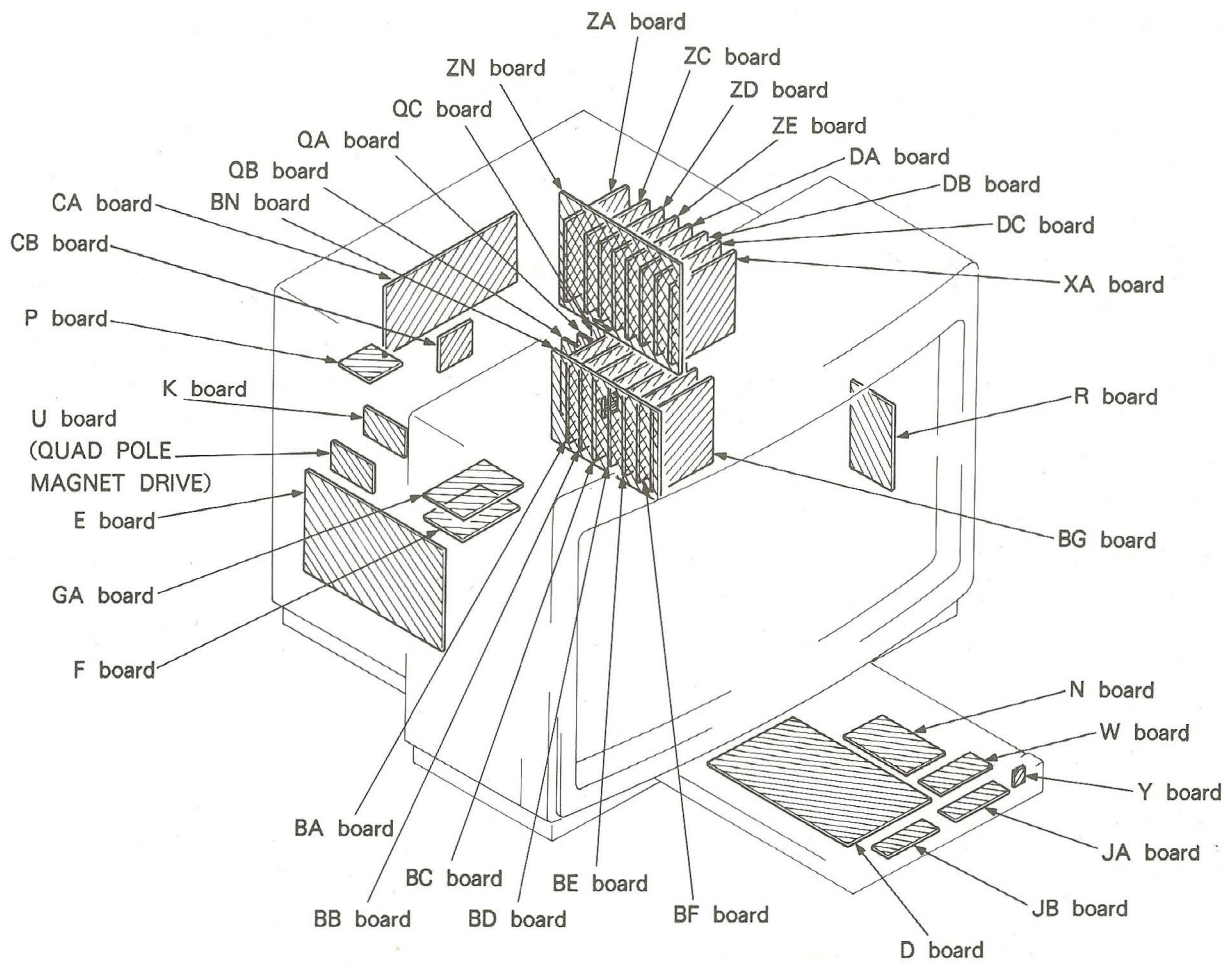


SECTION 4 ADJUSTMENT

4-1. INTERNAL VIEW DIAGRAM



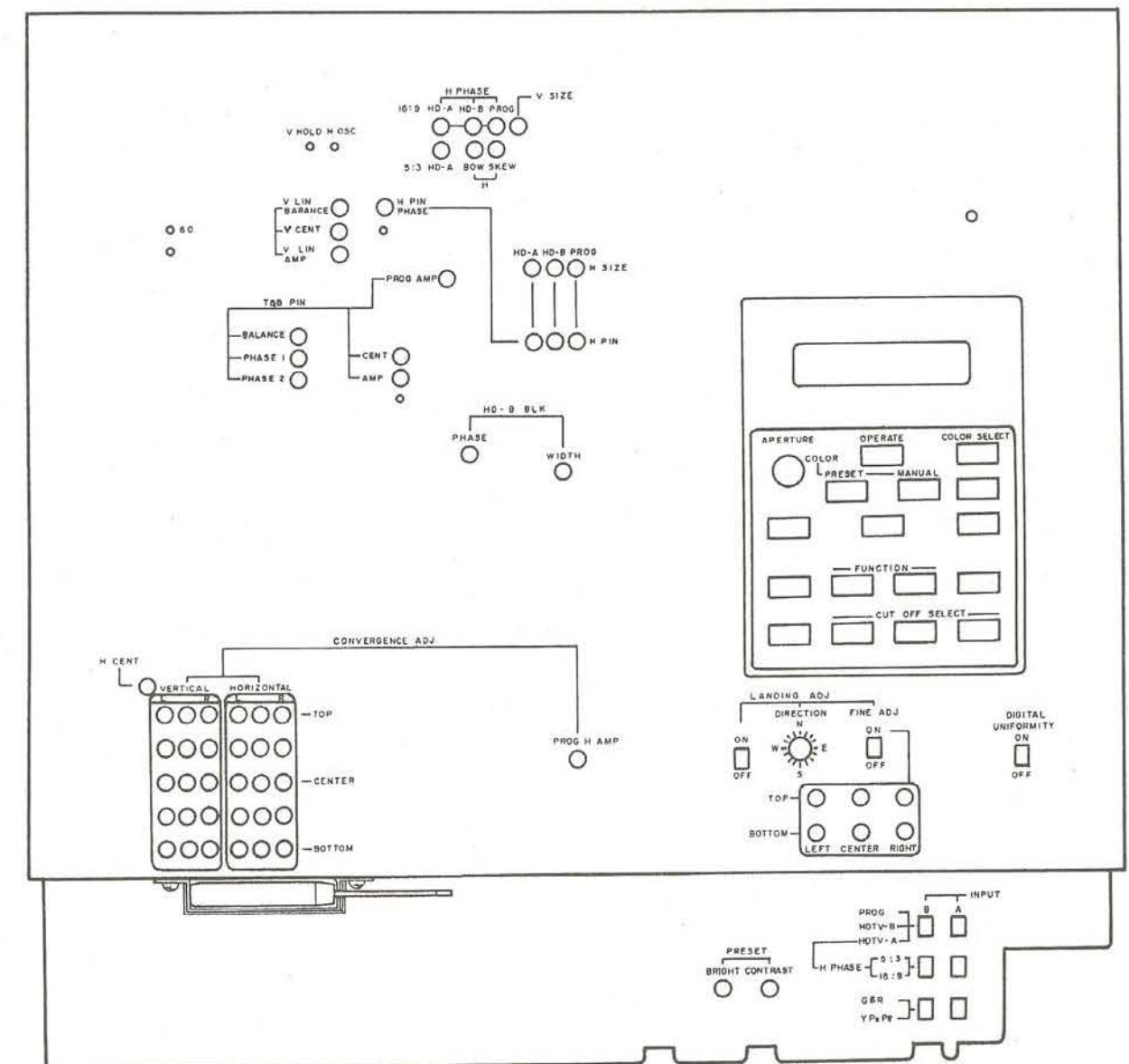
4.2. BOARD ARRANGEMENT DIAGRAM



4-3. QUICK REFERENCE

SECTION \ BOARD	BA	BB	BC	BD	BE	BF	BG	BN	CA	CB	D	DA
CIRCUIT DESCRIPTION	3-18	3-19	3-21	3-11	3-23	3-24	3-11	—	3-13 3-28	—	3-1	3-33
ADJUSTMENTS	—	4-39	4-42	—	4-44	4-45	4-49	—	4-51	—	4-25 4-28	4-34
BLOCK DIAGRAM	5-1	5-1	5-2	5-3	5-2	5-2	5-3	—	5-4	5-14	5-12	5-10
MOUNTING DIAGRAM	5-21	5-29	5-31	5-40	5-41	5-49	5-51	5-59	5-63	5-62	5-68	5-77
SCHEMATIC DIAGRAM	5-23	5-27	5-33	5-36	5-43	5-46	5-53	5-56	5-65	5-66	5-71	5-74
ELECTRICAL PARTS LIST	7-1	7-13	7-10	7-3	7-16	7-18	7-20	7-10	7-24	7-24	7-38	7-30
SECTION \ BOARD	DB	DC	E	K	P	U	GA	F	JA	JB	Y	N
CIRCUIT DESCRIPTION	3-37	3-39	3-6	—	—	3-8	3-9	3-8	—	—	—	3-31
ADJUSTMENTS	4-35	—	4-27	—	—	—	—	—	—	—	—	—
BLOCK DIAGRAM	5-9	5-8	5-12	5-12	5-12	5-13	5-13	5-13	5-4	5-4	5-4	5-6
MOUNTING DIAGRAM	5-79	5-87	5-91	5-90	5-90	5-90	5-99	5-99	5-100	5-100	5-100	5-101
SCHEMATIC DIAGRAM	5-81	5-84	5-93	5-95	5-95	5-95	5-97	5-97	5-98	5-98	5-97	5-103
ELECTRICAL PARTS LIST	7-32	7-33	7-34	7-47	7-5	7-46	7-23	7-5	7-45	7-46	7-47	7-9
SECTION \ BOARD	QA	QB	QC	R	W	ZA	ZC	ZD	ZE	ZN	XA	
CIRCUIT DESCRIPTION	3-17	3-17	3-17	3-10	3-10	3-31	3-31	3-32	3-32	—	—	
ADJUSTMENTS	4-37	—	—	4-36	4-36	—	—	—	4-54	—	—	
BLOCK DIAGRAM	5-1	5-1	5-1	5-14	5-13	5-7	5-6	5-7	5-10	—	—	
MOUNTING DIAGRAM	5-105	5-105	5-105	5-110	5-112	5-119	5-121	5-129	5-131	5-139	5-141	
SCHEMATIC DIAGRAM	5-107	5-107	5-107	5-113	5-114	5-116	5-123	5-126	5-133	5-136	—	
ELECTRICAL PARTS LIST	7-6	7-7	7-8	7-52	7-45	7-49	7-50	7-54	7-47	7-47	7-47	

4-4. SUB CONTROL PANEL



4-5. SET-UP ADJUSTMENT

It describes the setting adjustment and adjusting method when the CRT is replaced.

Moreover, normally, the convergence and white balance adjustments should be performed with the volume of the subcontrol panel. (See SECTION 1 OPERATION.)

[JIG TOOLS AND MEASURING INSTRUMENTS REQUIRED]

1. Signal generator
2. Oscilloscope
SONY TEKTRONIX 2465 type or equivalent
3. Color analyzer
MINOLTA TV-COLOR ANALYZER II or equivalent
4. Digital voltmeter
Number of the effective digits: Over 5 digits
5. Tracking scope
TAKEDARIKEN TR4110+TR4114T or equivalent
6. Pulse generator
HP8007B or equivalent
7. FET probe
8. Frequency counter
9. Beam landing adjusting jig

4-5-1. Setting adjustment

When the horizontal or vertical terrestrial magnetism strength differs by changing the setting of the location, the purity cannot be adjusted by the LANDING ADJ of the W board. In this case, the following adjustments become necessary.

Note: The terrestrial magnetism strength of the HDM-3080/3830E has been adjusted to 0.25 gauss for the horizontal strength and 0.50 gauss for the vertical strength at the time of shipment.

[WHEN IT IS SHIFTED TO A LOCATION WHERE THE VERTICAL TERRESTRIAL MAGNETISM STRENGTH DIFFERS]

- Purity adjustment is necessary.

Note: The Landing is influenced by the cabinets. Make a purity adjustment with the top and side cabinets installed (the back cabinet should be removed).

1. Receive the white signal in the state of CONTRAST and BRIGHTNESS being preset (The manual switch is turned OFF.) and maintain the current flow for over 30 minutes.
2. Set it with the CUT OFF SELECT on the N board to green pure color.
3. Turn OFF the LANDING ADJ ON/OFF SW (SW2) on the W board.
4. Set degauss by pressing the DEGAUSS SW.
5. Remove the cabinet and adjust by turning the purity knob of the deflection yoke so that the center of the screen becomes brightest in green.

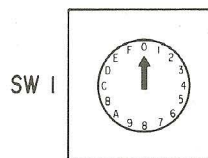
Note: An accurate landing adjustment can be achieved by using the beam landing adjustment jig.

6. Turn On the LANDING ADJ ON/OFF SW (SW2) on the W board, after matching so that the DIRECTION SW (SW1) faces the front of the CRT and by making into single colors of red, green and blue, confirm that the respective colors are all pure.

[WHEN IT IS SHIFTED TO A LOCATION WHERE THE HORIZONTAL TERRESTRIAL MAGNETISM STRENGTH DIFFERS]

- The adjustment of the reference voltage of the direction correction signal (R board) becomes necessary.
1. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to SE (6).
 2. Connect a DC voltmeter to TP1 on the R board and adjust with RV1 so that it becomes TP1 = A (V).
 3. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to S (8).
 4. Connect a DC voltmeter to TP3 on the R board and adjust with RV2 so that it becomes TP3 = B (V).

Note: The A and B differ depending upon the strength of the horizontal terrestrial magnetism (BH).



B _H (GAUSS)	0.1	0.2	0.3	0.4	0.5
A (V)	-0.77	-1.53	-2.30	-3.07	-3.83
B (V)	-1.50	-3.00	-4.50	-6.00	-7.50

4-5-2. Adjustment after Replacing CRT

The following adjustments become necessary after replacing the CRT.

- Deflection yoke installation adjustment

Note: This adjustment is unnecessary when the adjusted deflection yoke has been installed to the new picture tube.

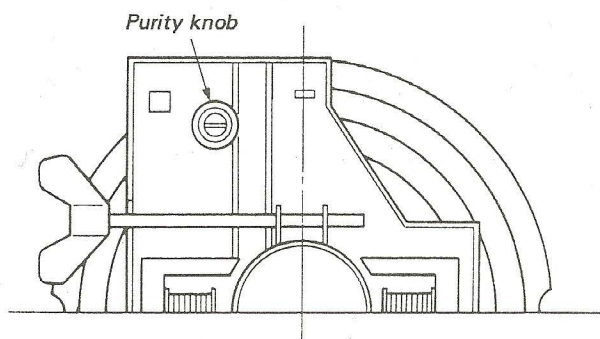
- Purity adjustment
- LANDING ADJ preset adjustment
- Focus adjustment
- Convergence adjustment
- Replacement of ROM (IC101, IC201, and IC301) of the ZE board.
- G2 adjustment
- Color temperature adjustment

[DEFLECTION YOKE INSTALLATION ADJUSTMENT]

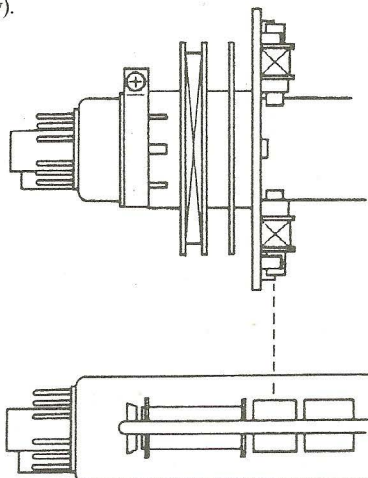
1. Receive the white signal, and maintain the current flow for over 30 minutes under the condition of the CONTRAST MANUAL and BRIGHTNESS MANUAL VR are being preset.
2. Press the CONTRAST MANUAL SW and turn the CONTRAST MANUAL VR fully clockwise. Turn OFF the LANDING ADJ ON/OFF SW (SW2) on the W board.

[PURITY ADJUSTMENT]

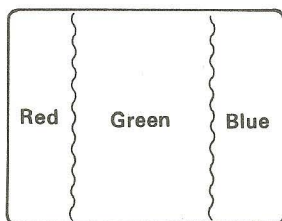
1. Set the purity knob to the mechanical center.
- Note:** Be sure to use the DEGAUSS switch after an interval of for over 5 minutes when it is used continuously.



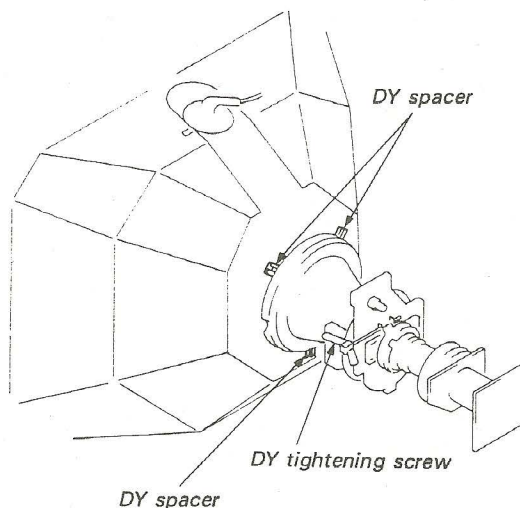
2. Attach tightly the DY to the CRT.
3. Fix the Neck assembly to the position shown in (Fig. below).



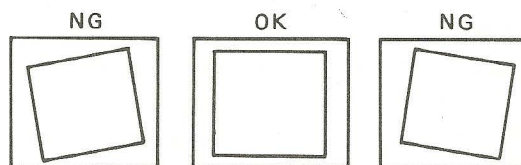
4. Make it into pure green color with the CUT OFF SELECT of the subcontrol panel (N board). Turn OFF the red and blue.
5. Adjust the purity magnet so that the green comes at the center of the screen.



6. Pull back the DY and make the screen entirely green raster.
 7. Adjust the screen into pure red color with the CUT OFF SELECT of the N board.
 8. Perform the adjustments of steps 5 and 6 in red so that the entire screen becomes into pure red color.
 9. Adjust the screen into pure blue color with CUT OFF SELECT on the N board.
 10. Perform the adjustments of steps 5 and 6 in blue so that the entire screen becomes in pure blue color.
 11. Be sure to confirm that the respective pure color rasters of red, green, and blue are not mislending with one another.
 12. Fix the DY. (Tighten the DY fixing screw.)
 13. When there is a vertical misconvergence on the X axis, shake the DY neck and insert the wedge-shaped DY spacer between the neck and yoke.
- Note:** At this point, be sure to keep the V CONV (RV24 and RV34) of the sub control panel (D board) to the center.



14. Be sure to confirm that the raster does not skew.

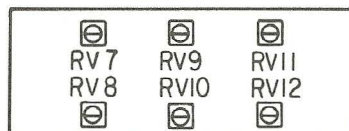


[LANDING ADJ PRESET ADJUSTMENT]

1. Install the cabinet. (Installation by means of screw tightening is unnecessary)
2. Remove the subcontrol panel within the drawer.
3. Be sure to confirm that the set is placed eastward and the white signal has been fed for over 30 minutes.
4. Set ON the LANDING ADJ ON/OFF SW (SW2) on the W board, set OFF the LANDING FINE ADJ ON/OFF SW (SW3) on it, and set the DIRECTION LANDING ADJ SW (SW1) on it to E (4).
5. Adjust with the CUT OFF SELECT on the N board so that it becomes into pure green color.
6. Press the DEGAUSS SW to demagnetize.
7. Adjust by turning the volumes RV9 and RV10 on the W board respectively so that the upper center section of the screen becomes the brightest and uniformly green with the former and the lower center section of the screen becomes the brightest and uniformly green with the latter.

Note: The purity is deviated a little by drawing out the drawer, so perform the adjustment by drawing it as little as possible.

W board

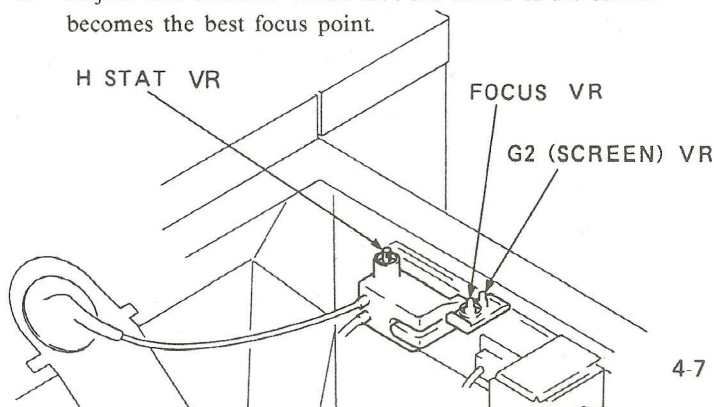


8. Similarly to the above, adjust with RV 7, 8, 11, and 12 so that the upper right and left sides and the lower right and left sides of the screen become bright and uniformly pure green color.
9. Press the DEGAUSE SW to demagnetize.
10. Be sure to confirm that the entire screen is in pure green color.
11. By setting the color of the screen in pure red color with the CUT OFF SELECT on the N board, be sure to confirm that the screen becomes in pure red color. By setting the color of the screen in pure blue color with the CUT OFF SELECT on the N board, be sure to confirm that the screen becomes in pure blue color.
12. When either of the above is not clear enough, repeat the adjustments of steps 6 to 11.

Note: The landing adjustments of steps 7 and 8 can accurately be made by using the beam landing adjustment jig.

[FOCUS ADJUSTMENT]

1. Receive the inverse double crosshatch signal (black in white base) with the internal signal.
2. Adjust with FOCUS VR so that the center of the screen becomes the best focus point.



[CONVERGENCE ADJUSTMENT]

Preparation: Set the selection switch SW to HDTV-A mode.

1. Input the crosshatch signal (Internal or external signal)

Note: Take note that there is a possibility that the picture of the internal SG differs in the picture phase from that of the external SG.

It can be matched with H PHASE of the sub control panel (D board).

2. Turn ON (□) the CONTRAST MANUAL SW on the front panel and adjust with the CONTRAST MANUAL VR so that the crosshatch can be seen with ease.
3. Be sure to confirm that it becomes into a stabilized state after flowing current for over 30 minutes.
4. Reset the digital convergence data of the HDTV-A.
5. Reset the digital convergence data of the normal scan.
6. Press the [MODE] key.

CONVER HDTV-A
COARSE NO. ## RGB

is displayed.

7. Press simultaneously continuously the OPERATE keys [◀] and [▶] for over 1 second.

It has been completed when

RESET
COMPLETE

is displayed.

8. Reset the FINE data of the convergence.
Press the [MODE], [FORWARD] and [CURSOR/DATA] keys.

CONVER HDTV-A
FINE DATA RGB

is displayed.

9. Press simultaneously and continuously the OPERATE keys [◀] and [▶] for over 1 second.

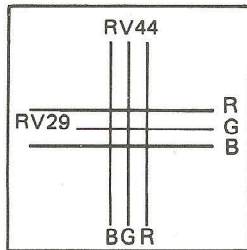
RESET
COMPLETE

is displayed.

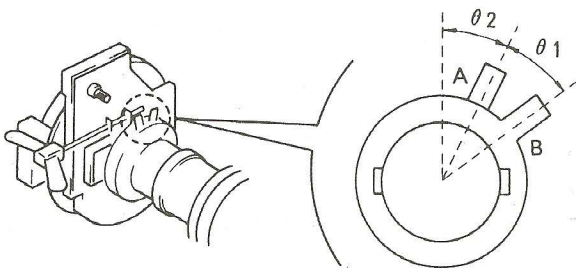
• **Static convergence adjustment (Place the set eastward)**

Note: Since steps 1 to 4 have previously been adjusted, it is unnecessary to adjust other than when replacing the DY.

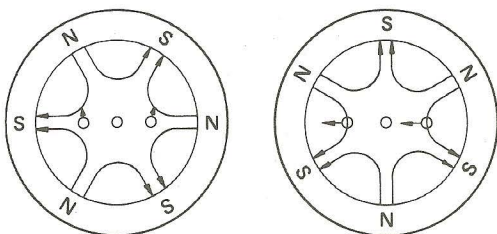
1. Adjust by turning the center VR (RV29 and RV44) of the V and H convergences of the sub control panel (D board) so that the 3 colors of red, green, and blue become into parallel lines at the center.



2. At this point, when the color deviation in horizontal direction is small, turn the H-STAT VR within the HV block.
3. Turn the 6-pole magnet ring positioned at the rear of the DY and adjust so that the distance between the red and green and that of blue and green of the 3 colors parallel lines become equivalent. (Alter θ_1 and θ_2 .)



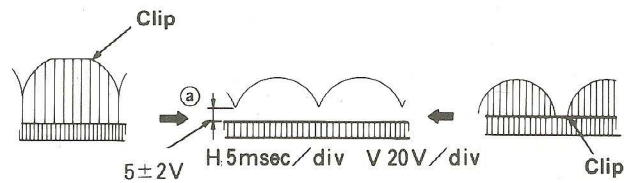
Note: Movement of the correction due to 6-pole magnet ring Generate the magnetic flux of the equivalent amount and equivalent direction against the side beams (blue and red) and change the correction amount by varying the opening angle of the 2 sheets of the magnets and change the correction direction by turning simultaneously the 2 sheets of the magnets to converge the side beams.



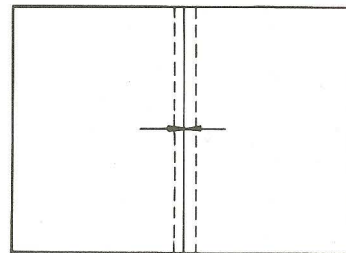
Correction due to 6-pole magnet ring

4. Perform rough adjustment of the convergence with the VR on the sub control panel (D board).
5. Connect probe to the positive pole of C35 on the E board. The parabolic DC level of the V period of a changes when turning the center VR (RV44) of the H convergence on the sub control panel (D board). Adjust RV44 so that the upper and lower points of the DC level are not clipped.

Note: Be sure to perform this adjustment when the movement of RV44 is not smooth.



6. Match the horizontal misconvergence at side of the center of the screen by turning the H STAT VR of the HV block.



7. Make painted lock of the H STAT VR.

• **Dynamic Convergence (Analog section) Adjustment**

1. Adjust with the convergence VRs on the sub control panel (D board).
2. Each VR corresponds to a screen portion.
3. Red and blue symmetrically moves against green for the adjustment. (Green does not move.)
4. Make the adjustment in the order from the center, Y axis, X axis and to the corners on the screen.

• **V-Convergence Phase Adjustment** (Normally unnecessary because this adjustment has already been made at the time of shipment.)

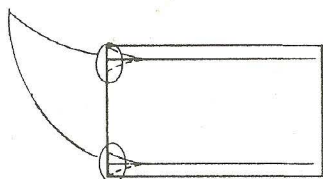
Connect a probe to the Q81 collector on the D board and set the pulse width at $1.5 \pm 0.05 \mu\text{sec}$ by turning RV75 (V-CONV PHASE).

• **V-Sub Convergence Adjustment** (Normally unnecessary because this adjustment has already been made at the time of shipment.)

1. Select the HDTV SYSTEM A mode and reset the digital convergence (both COARSE and FINE). (Refer to P4-7)
2. Turn RV78 (V SUB CONV) counterclockwise fully.
3. Set volume RV22 through RV36 to the mechanical center and closely match the H convergence with RV36 through RV51.
4. Match with RV27 through RV31 (V convergence in the center).

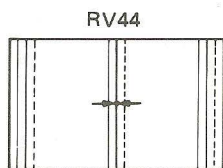
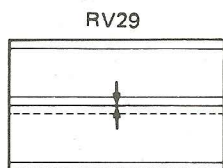
5. Turn RV22 clockwise fully and RV26 counterclockwise fully.
6. Turn RV78 clockwise so that respective R.G.Bs become almost parallel on the left edge.
7. Here, make an analog convergence adjustment again.

Match the R.G.Bs so that they become almost horizontal.



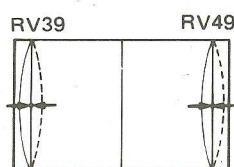
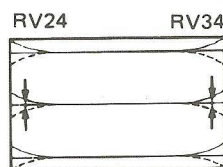
• Convergence Adjustment Procedure

1. Input the cross-hatch signal and select the HDTV SYSTEM A mode.
2. Reset the digital convergence data.
3. Set the CONTRAST MANUAL SW and BRIGHTNESS MANUAL SW on the front panel to ON (⏻), respectively, and turn the corresponding VRs to the appropriate position for easy observation.
4. Match RGB of the screen center with RV29 and RV44.

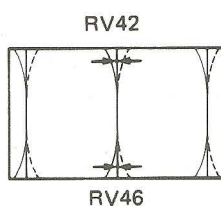
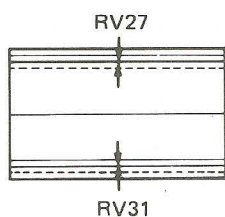


5. Match the respective RGBs of the screen the left and the right (on X axis) from the center with RV24, RV34, RV39 and RV49.

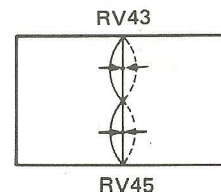
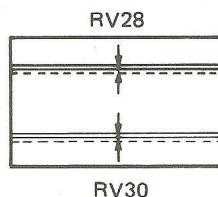
Note: Match first with RV34 and RV49 (on the right side).



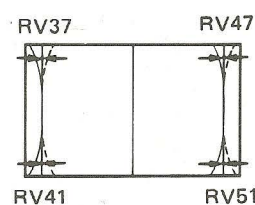
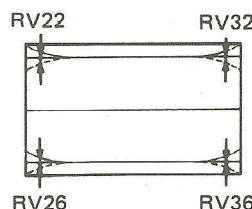
6. Match the respective RGBs of the screen upper and the lower (on Y axis) from the center with RV27, RV31, RV42 and RV46.



7. Match the respective RGBs of the screen upper middle section and the lower middle section from the center with RV28, RV30, RV43 and RV45.

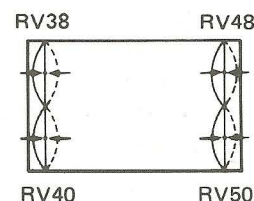
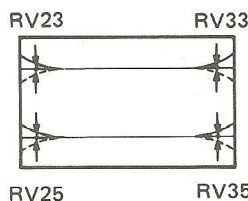


8. Match the respective RGBs of the screen corners with RV2, RV26, RV32, RV36 and RV37, RV41, RV47, RV51.



Note: Match first with RV32, RV36, RV47 and RV51 (on the right side).

9. Match the convergences of the screen middle upper left and right and the middle lower left and right with RV23, RV25, RV33, RV35 and RV38, RV40, RV48, RV50.



Note: Match first with RV33, RV35, RV48 and RV50 (on the right side).

10. If the convergence is not correct at this time yet, perform the adjustment again from step 4 above.

• Digital Convergence Adjustment

Confirm that the mode is set to HDTV SYSTEM A, and then adjust the convergence with the control unit (N board). See Section 1 "OPERATION FOR ADJUSTMENT PROCEDURES".

Resetting and adjusting of the digital convergence are also necessary for the HDTV SYSTEM B and 525PROG.

For the 525PR, first make this adjustment before you make the digital convergence adjustment. After adjusting the screen size, reset the digital convergence and match the H AMP of PROG with RV71.

[G2 ADJUSTMENT]

1. Set SW and VR as follows.

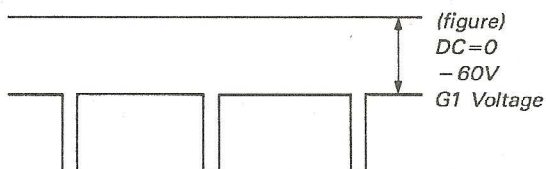
Front Panel

INPUT SELECTION SWITCH A CH
 CONTRAST MANUAL SW Preset
 BRIGHT MANUAL SW Preset

Inside of Drawer

PRESET CONTRAST VR..... Mechanical Center

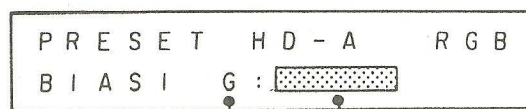
2. Reset the PRESET data for color temperature.
 Select the PRESET with the color temperature selection mode and then reset the data with the color temperature adjustment mode. The system selection switch on the JA board may be set anywhere. See the following description of transfer procedures part I for color temperature adjustment modes, part II for data selection method for the color temperature selection mode, and part III for resetting procedures.
3. Reset color temperature data for each MANUAL (HD-A), MANUAL (HD-B) and MANUAL (525PR).
 - 1) Select MANUAL with the color temperature selection mode and then set the color temperature adjustment mode.
 - 2) Select the HD-A with the system selection switch on the JA board, then reset the data.
 - 3) Select the HD-B with the system selection switch on the JA board, then reset the data.
 - 4) Select the 525PR with the system selection switch on the JA board, then reset the data.
4. Using VR and TP on the CA board, adjust the G1 voltage of each R, G and B at -60V.



5. Adjust the G2 (SCREEN) VR so that one of the most luminous colors of R, G and B, becomes slightly more luminous than the reset.
6. Paint lock the G2 (SCREEN) VR.

[COLOR TEMPERATURE (PRESET DATA) ADJUSTMENT]

1. Be sure to perform the G2 adjustment before performing the color temperature adjustment. Set SW and VR the same as in the G2 adjustment.
2. Select PRESET as the color temperature selection mode, then set the color temperature adjustment mode. Set the system selection switch on the JA board to the HD-A.
3. Reset the PRESET data.
4. Using the color analyzer, adjust the PRESET data at 6500°K as follows.

4.1. BIAS 1 ADJUSTMENT

Indicates the fine adjustment value.

Indicates the color to be adjusted.

(Set by pressing the COLOR SELECT keys, **RED**, **GREEN**, or **BLUE**.)

Make adjustments as follows using the control unit on the CA board:

Color Temperature 6500°K

Luminance 0.5NIT

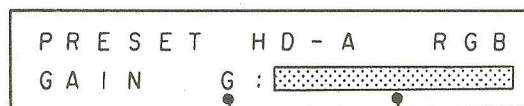
Use the following keys for fine adjustments.

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

When the OPERATE key **<** is pressed, the screen gets darker. When **>** is pressed, the screen gets brighter. Adjust the brightness as much as possible using the coarse VR control.

4.2. GAIN ADJUSTMENT

Press the **FORWARD** FUNCTION key to obtain the following display.



Indicates GAIN adjustment value.

Indicates color to be adjusted.

(Set by pressing the COLOR SELECT keys **RED**, **GREEN**, or **BLUE**.)

Adjust as follows using the control unit and the PRESET CONTRAST VR on the JA board:

Color Temperature 6500°K

Luminance 0.5NIT

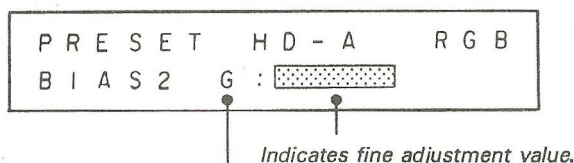
Adjust the color temperature by first fixing the darkest of the three colors and then by bringing the other two nearer to that fixed, darkest color.

Use the following keys for adjustments.

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

- 4.3. Press the **BACK** FUNCTION key to set to the BIAS 1 adjustment mode, and re-adjust the color temperature of the black level.
Repeat steps 4.2 and 4.3 until a optimum color temperature is obtained.

- 4.4. BIAS 2 Adjustment
Press the **FORWARD** FUNCTION key to obtain the following display.



Indicates color to be adjusted.

(Set by pressing the COLOR SELECT keys **RED**, **GREEN**, or **BLUE**.)

Adjust as follows using the control unit on the CA board:
Color Temperature 6500°K
Luminance 0.5NIT
Use the following keys for adjustments.

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

- 4.5. Press the **BACK** FUNCTION key to set to the GAIN adjustment mode and re-adjust the color temperature of the white level. Repeat the steps 4.5 and 4.6 until a optimum color temperature is obtained.

- 4.6. Press the **MODE** key to release the color temperature adjustment mode.

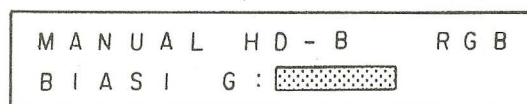
[COLOR TEMPERATURE (MANUAL HD-A DATA) ADJUSTMENT]

1. Adjust the color temperature (PRESET data) to bring the PRESET data for 6500°K, and then perform the following adjustments.
2. Select MANUAL as the color temperature selection mode and then set the color temperature adjustment mode. Set the system selection switch on the JA board to the HD-A.
3. Reset the MANUAL (HD-A) data.
By doing this, the PRESET data is transferred to the MANUAL (HD-A).
4. Press the MODE key to release the color temperature adjustment mode.

[COLOR TEMPERATURE (MANUAL 525PR DATA) ADJUSTMENT]

1. Select MANUAL as the color temperature selection mode and then set the color temperature adjustment mode. Set the system selection switch on the JA board to the HD-B.
2. Reset the MANUAL (HD-B) data.
3. Adjust the MANUAL (HD-B) data with the color analyzer and set the color temperature at 9300°K as follows.

3.1. BIAS 1 ADJUSTMENT



Adjustment as follows using the control unit.

Color Temperature 9300°K
Luminance 0.5NIT

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

3.2. GAIN ADJUSTMENT

Press the **FORWARD** FUNCTION key to obtain the following display.

```

MANUAL  HD - B   RGB
GAIN    G : 
  
```

Adjust as follows using the control unit.

Color Temperature..... 9300°K
Luminance 50NIT

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

3.3. Press the **BACK** FUNCTION key to select the BIAS 1 adjustment mode, then re-adjust the color temperature of the black level.
Repeat the steps 3.2 and 3.3 until the optimum color temperature is obtained.

3.4. BIAS 2 Adjustment

Press the **FORWARD** FUNCTION key to obtain the following display.

```

MANUAL  HD - B   RGB
BIAS 2  G : 
  
```

Adjust as follows using the control unit.

Color Temperature..... 9300°K
Luminance 0.5NIT

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

3.5. Press the **BACK** FUNCTION key to select the GAIN adjustment mode, then re-adjust the color temperature of the white level.

Repeat steps 3.5 and 3.6 until the optimum color temperature is obtained.

3.6. Press the MODE key to release the color temperature adjustment mode.

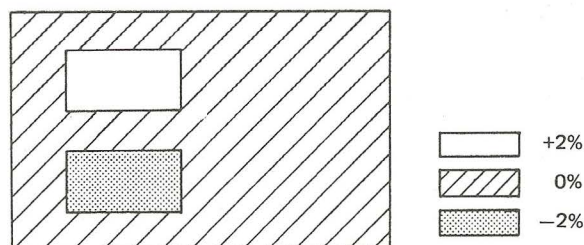
4. Select MANUAL as the color temperature selection mode, then set to the color temperature adjustment mode. Set system selection switch on the JA board to 525PR.
5. Copy the MANUAL (HD-B) data on the MANUAL (525PR). (See the following description, part III for copying method.)

[COLOR TEMPERATURE (MANUAL HD-B DATA) ADJUSTMENT]

The adjustment procedure is same as for MANUAL (HD-A), except that the system selection switch on the JA board is changed to HD-B.

[SETTING THE PRESET BRIGHTNESS AND PRESET CONTRAST ADJUSTMENT CONTROL]

1. Change the CONTRAST MANUAL switch and the BRIGHT MANUAL switch on the front panel to the preset positions. Change the system selection switch on the JA board to HD-A.
2. Display on the screen the PLUGE internal test signal. Adjust the brightness using the PRESET BRIGHT adjustment control on the JA board, so that the -2% portion and 0% portion become indistinguishable.

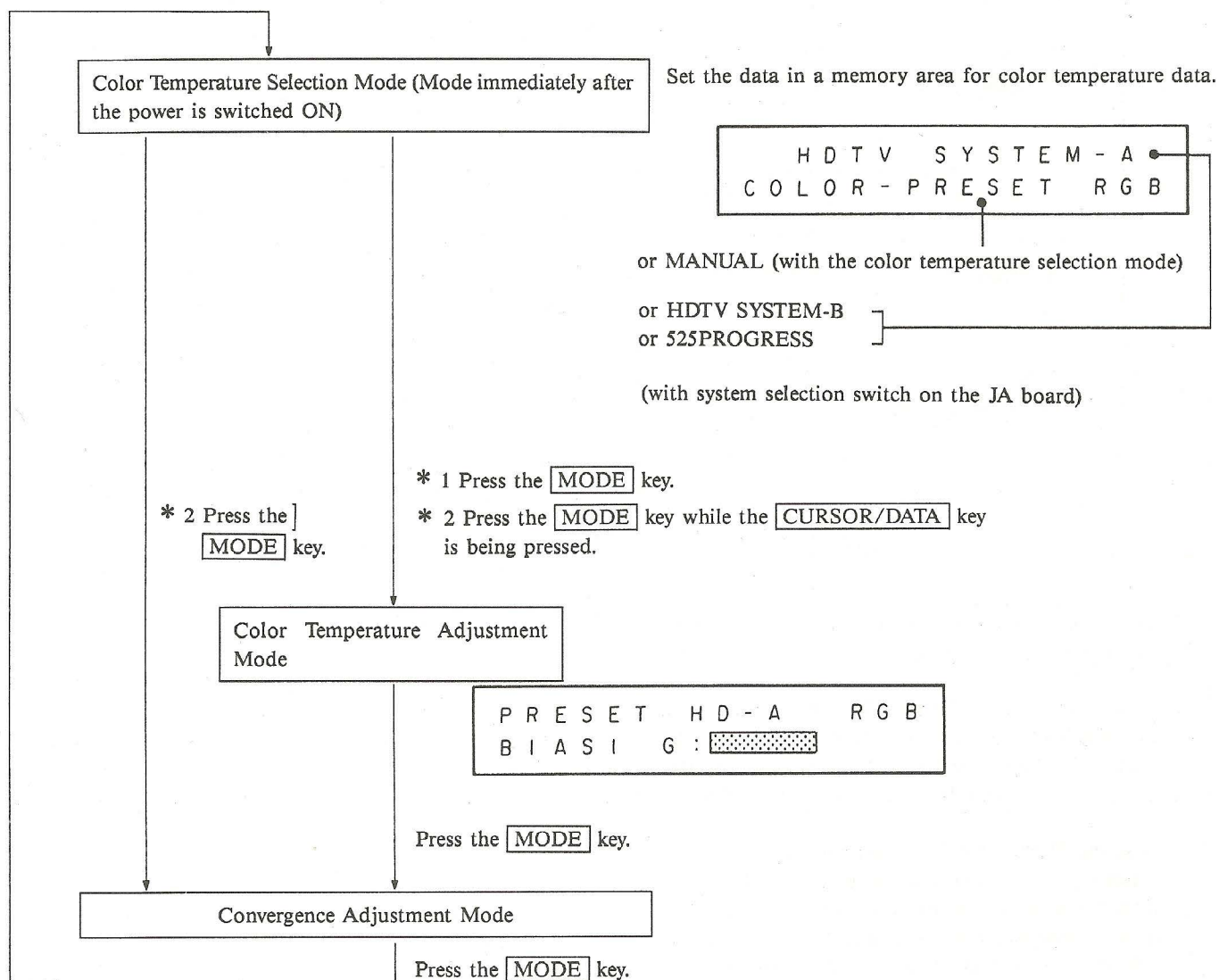


3. Display on the screen the FLAT FIELD internal test signal. Adjust the contrast with the PRESET CONTRAST adjustment control on the JA board using the luminance meter, so that the luminance becomes 50NIT.

I. Changeover in Adjustment Modes

The adjustment modes are changed over with the keys on the N board as illustrated below.

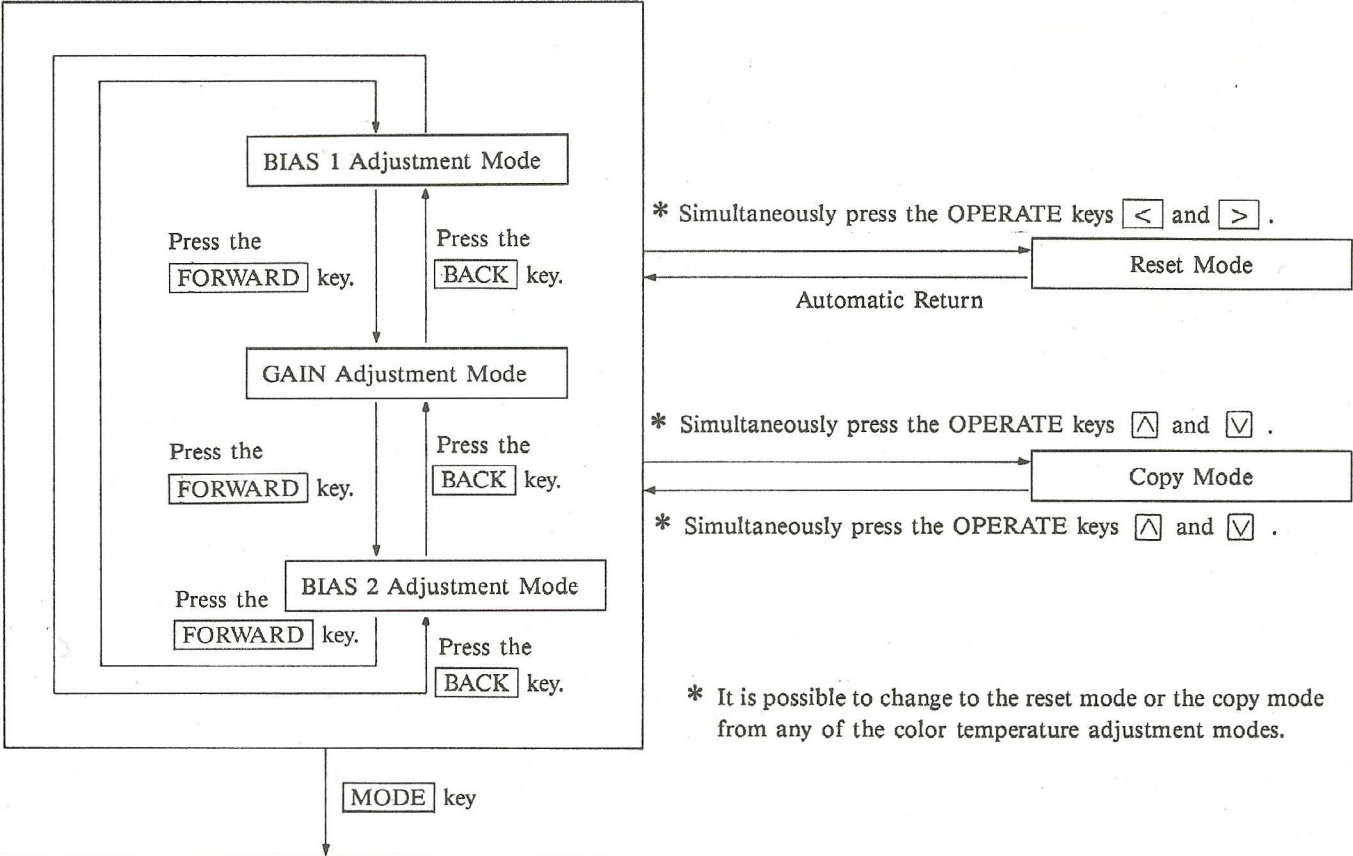
For G2 adjustment and color temperature adjustment, the color temperature selection mode and the color temperature adjustment mode are used.



*1 When MANUAL is selected as the color temperature selection mode.

*2 When PRESET is selected as the color temperature selection mode.

Color Temperature Adjustment Mode



The color temperature data are transferred to the battery backedup memory to release the color temperature adjustment data.

The BIAS 1, BIAS 2 and GAIN adjustment modes correct the data only in the work area. If the power is switched OFF without pressing the MODE key, all the corrections are erased. After adjusting the data, be sure to press the MODE key.

II. Selecting Method for Color Temperature Data

In this equipment, the color temperature data (BIAS 1, BIAS 2, GAIN) are stored in the memory unit.

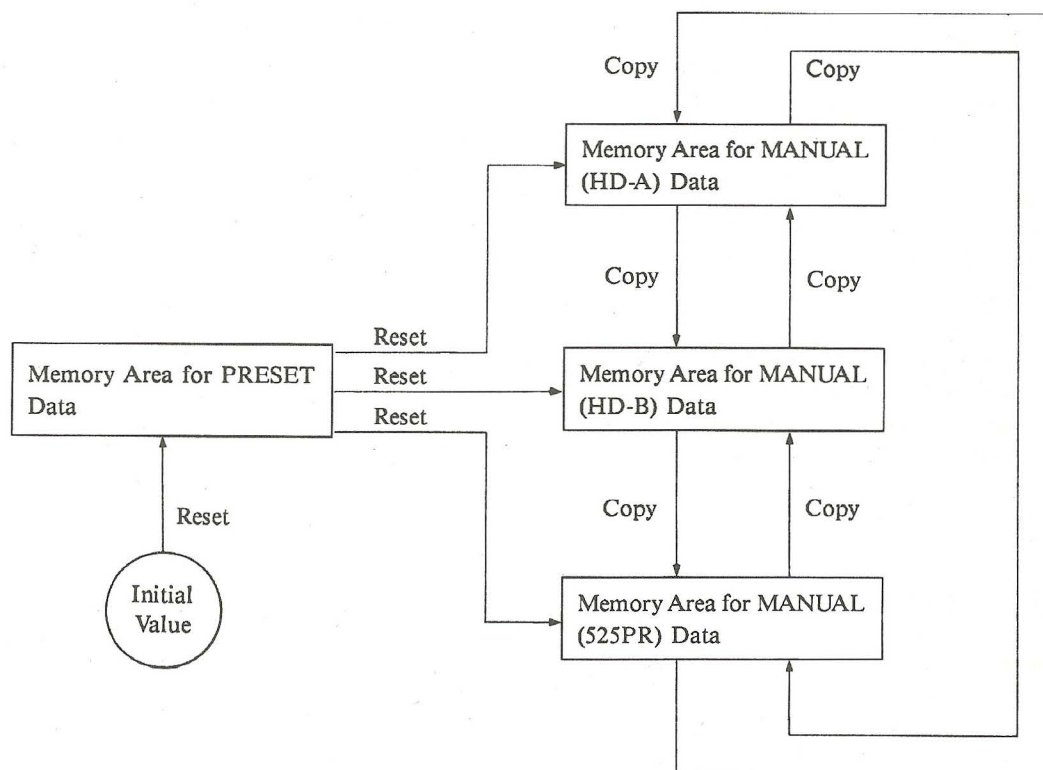
There are four memory areas, and selection of the data in each memory area is performed by setting the system selection switch (HD-A/HD-b/525PR) on the JA board and setting the color temperature selection mode.

		Setting the OPERATE Keys in Color Temperature Selection Mode	
		<	>
Setting system selection switch on the JA board	HD-A	PRESET data (6500°k at the time of shipment)	MANUAL (HD-A) data (6500°K at the time of shipment)
	HD-B		MANUAL (HD-B) data (6500°K at the time of shipment)
	525PR		MANUAL (525PR) data (9300°K at the time of shipment)

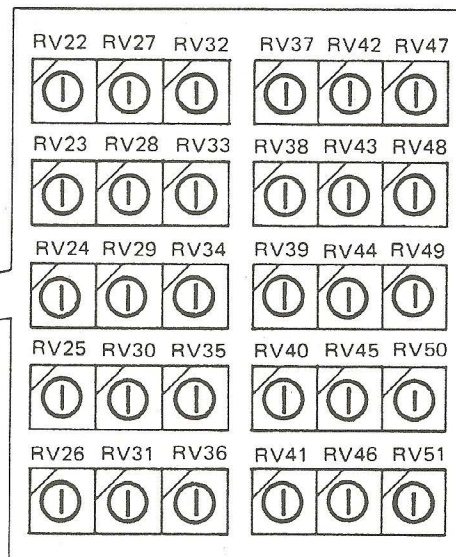
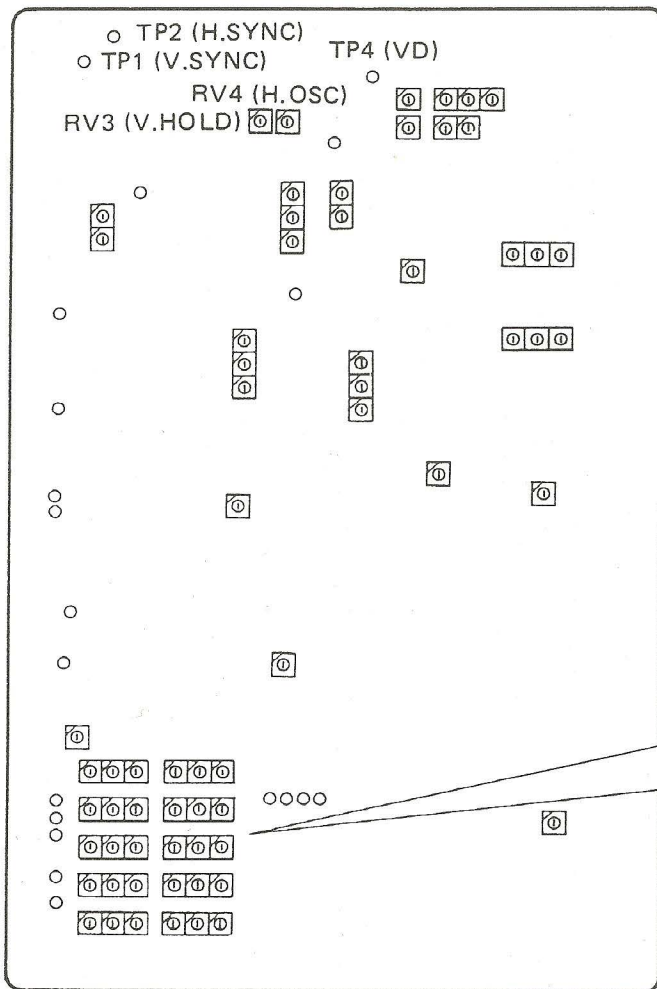
It takes some time before the system changes even if system selection switch is set. This does not mean the equipment has failed.

III. Resetting and Copying the Color Temperature Data It is possible to reset and copy the color temperature data in each memory area.

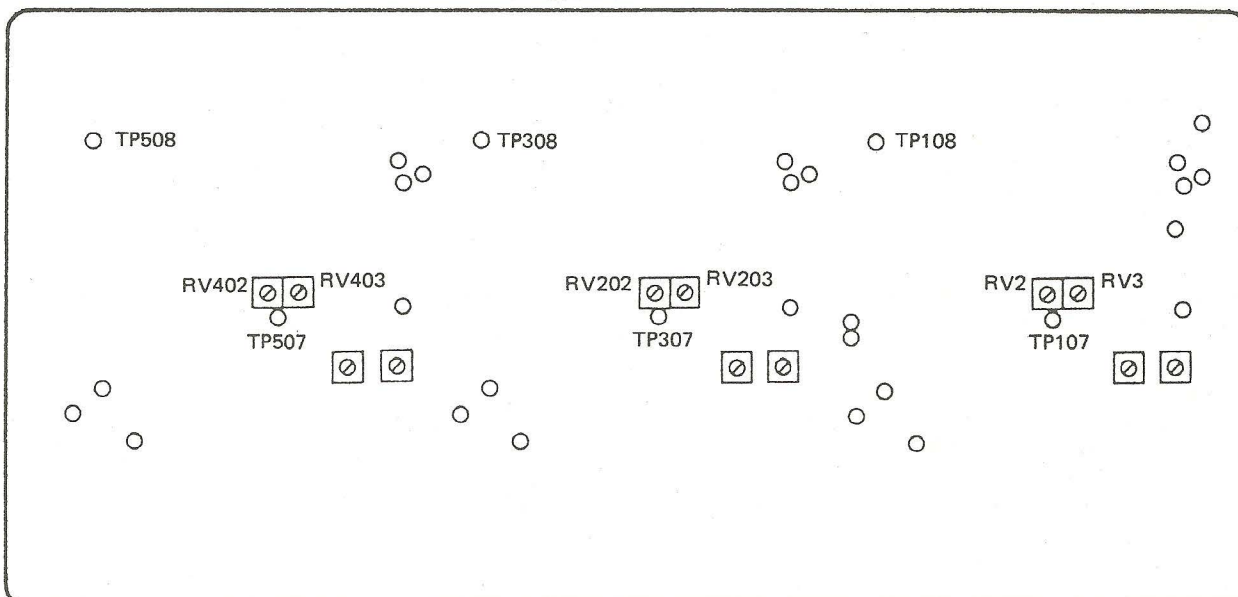
All the data (BIAS 1, BIAS 2 and GAIN data for R, G and B respectively) in the memory area are simultaneously reset and copied. The resetting and copying methods are referred to in "1-5-4. Resetting of Adjustment Data" and "Copying of Color Temperature" in "1-5-2. Color Temperature Adjustment".



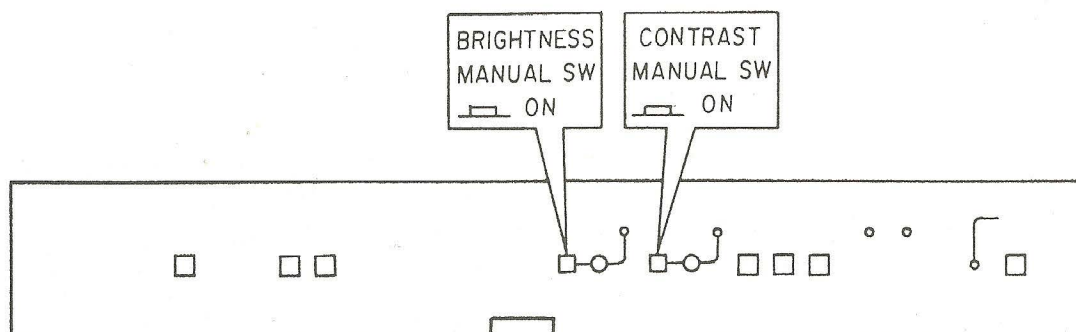
D board



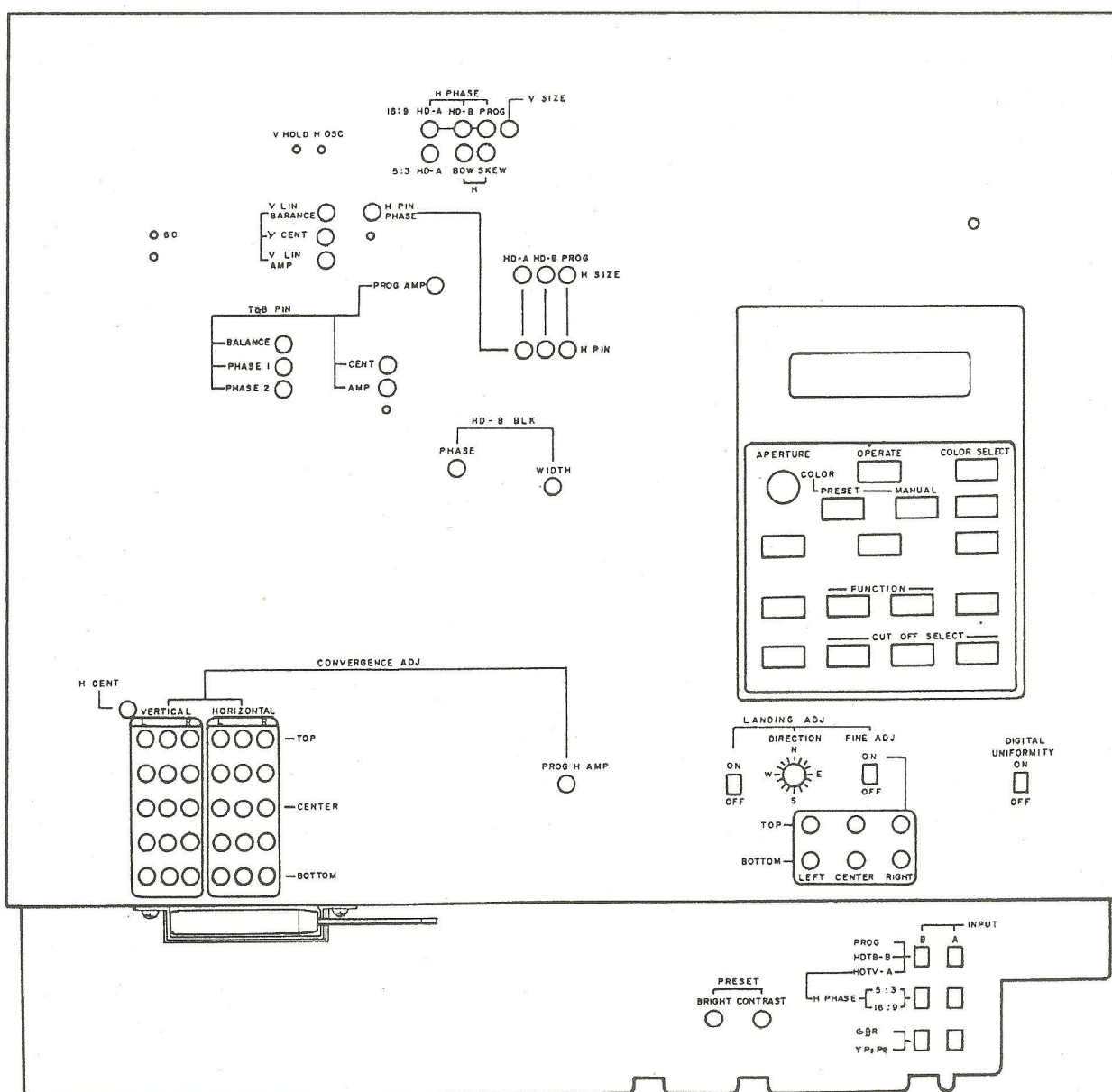
CA board



FRONT PANEL



SUB CONTROL PANEL





4-6. SAFETY RELATED ADJUSTMENT

HIGH VOLTAGE ADJUSTMENT

High voltage adjustment is necessary when the components shown below are replaced. Use a high voltage meter for the adjustment.

High voltage blocks, D40, R114, R115, R116, R184 and RV2

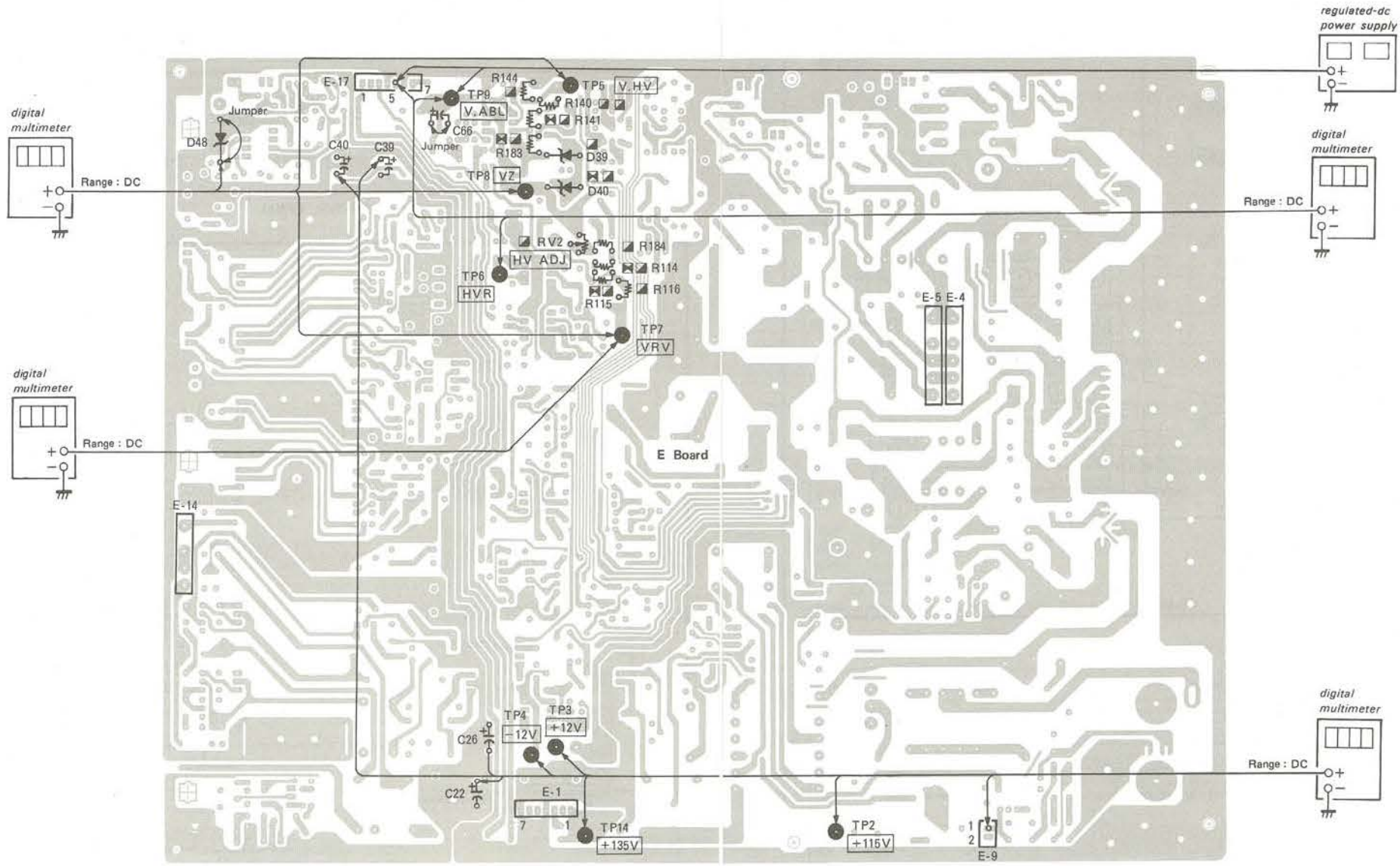
1. Receive the white signal and make VR into PRESET mode.
2. Connect a high voltage meter to the anode cap.
3. Adjust RV2 (VRV) to HV= 32±0.2 kV.
4. Switch the signal between white and black and be sure the high voltage deviation is less than 0.05kV.

Note: If a high voltage meter is not available, adjust the TP7 (VRV) voltage to 8.95±0.05VDC with RV2. Switch the signal alternately and be sure there is no deviation in screen size.

CONFIRMATION OF HIGH VOLTAGE CIRCUIT COMPONENT REPLACEMENT

The specified condition must be satisfied when the following components are replaced:

E board	
D40 μ PC574J.HZT33-02	TP8: Within 32.2±1.3VDC
R184 22k±1%	TP7: Adjustable to 8.95 \pm 0.15 VDC
R114 Adjustment resistor	Must be less than 9.30VDC at RV2 max.
R115 Adjustment resistor	
R116 10k±1%	
RV2 2k±10%	
	Metal grade VR
R183 Adjustment resistor	TP5: Within 9.45 \pm 0.05 VDC
R140 Adjustment resistor	
R141 Adjustment resistor	
R144 10k±1%	
D39 μ PC574J.HZT33-02	
D48 RD6.2EN	D48 cathode voltage: Within 6.0±0.50VDC
Power supply (TK18)	TP2: Within 115±1VDC
HV block, K board, E board	1. Operation confirmation of the high voltage regulator
D45, R145, 146, E board	2. Confirmation of the HV protector
IC5, R142, 143	
D44, R139, D54	
IC6, E board	3. Confirmation of the Ik protector II
D43, IC5, R137, E board	4. Confirmation of the Ik protector I



4-7. CIRCUIT ADJUSTMENT

CONNECTION METHOD DURING BOARD ADJUSTMENT AND SETTING OF SW

Unless otherwise specified in the following pages, the connection method and switch setting of SW must be made as follows:
When only HDTV SYSTEM A is used, it is unnecessary to make adjustments needed for HDTV SYSTEM B or PR.

SETTING POSITIONS OF SWITCHES AND CONTROL KNOBS

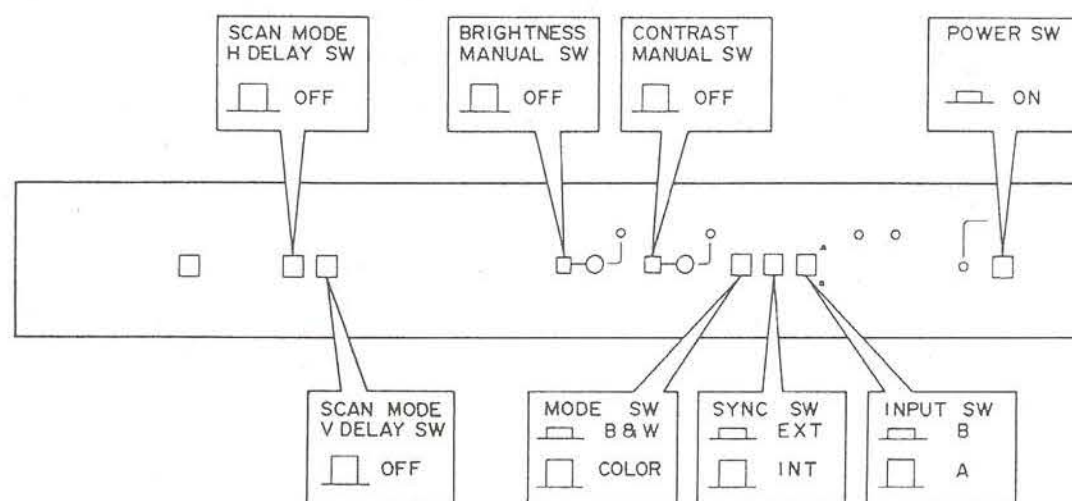
FRONT PANEL

1. INPUT switch A (□) — JA board
2. SYNC switch INT (□)
3. MODE switch COLOR (□)
4. CONTRAST MANUAL switch PRESET (□)
5. BRIGHTNESS MANUAL switch PRESET (□)
6. SCAN MODE V DELAY switch OFF (□) — JB board
7. SCAN MODE H DELAY switch OFF (□)

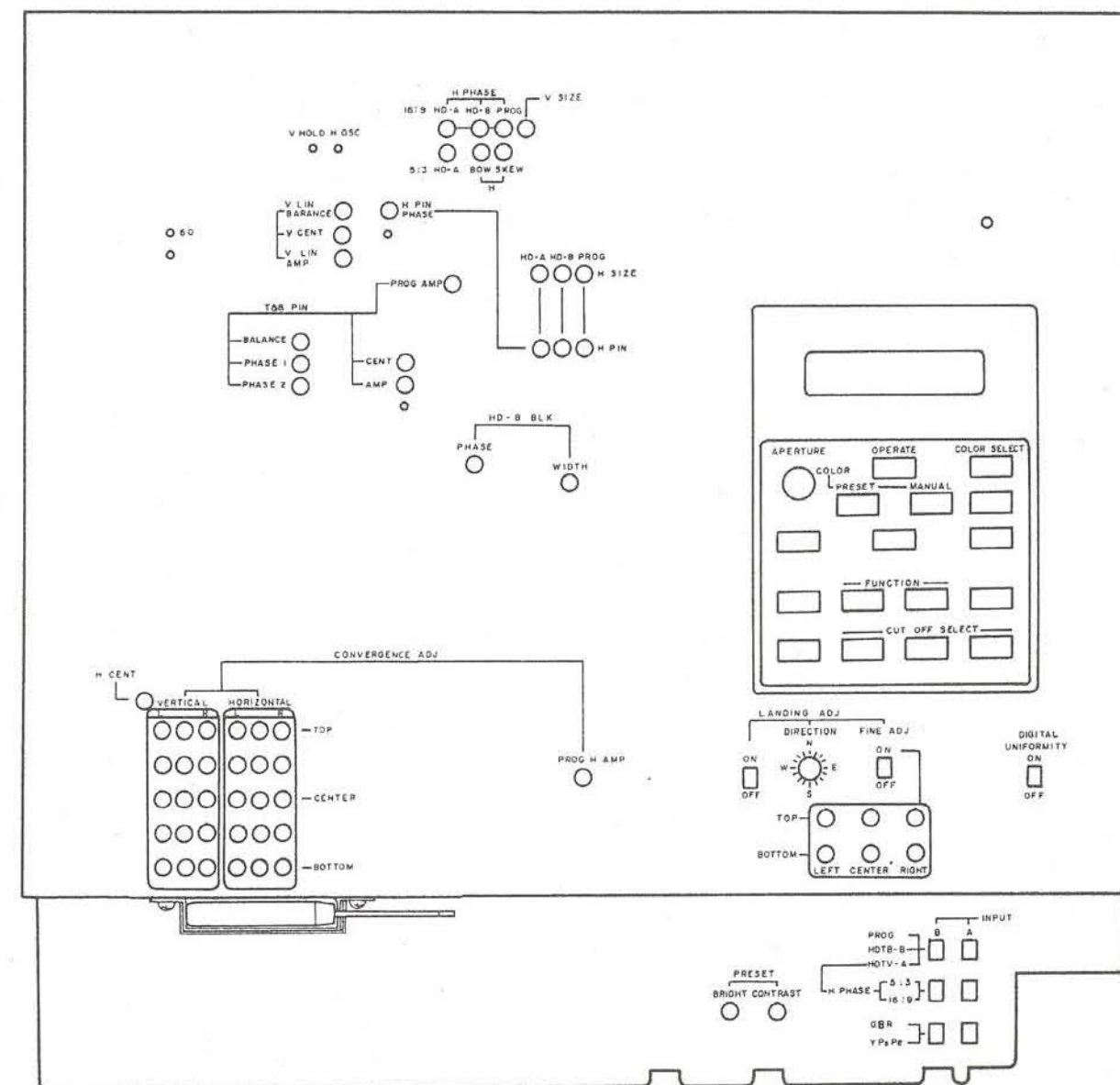
SUB CONTROL PANEL

8. Control unit Initial condition N board
9. LANDING ADJ ON/OFF switch (SW2) ON
10. LANDING ADJ DIRECTION switch (SW1) Match to monitor setting direction. W board
11. LANDING FINE ADJ ON/OFF switch (SW3) OFF
12. DIGITAL UNIFORMITY ON/OFF switch (SW4) ON
13. INPUT A MODE SELECT switch (SW102) GBR
14. INPUT B MODE SELECT switch (SW101) GBR
15. INPUT A H PHASE SELECT switch (SW109) 16:9
16. INPUT B H PHASE SELECT switch (SW108) 16:9
17. INPUT A SYSTEM SELECT switch (SW113) HDTV A
18. INPUT B SYSTEM SELECT switch (SW110) HDTV A

FRONT PANEL

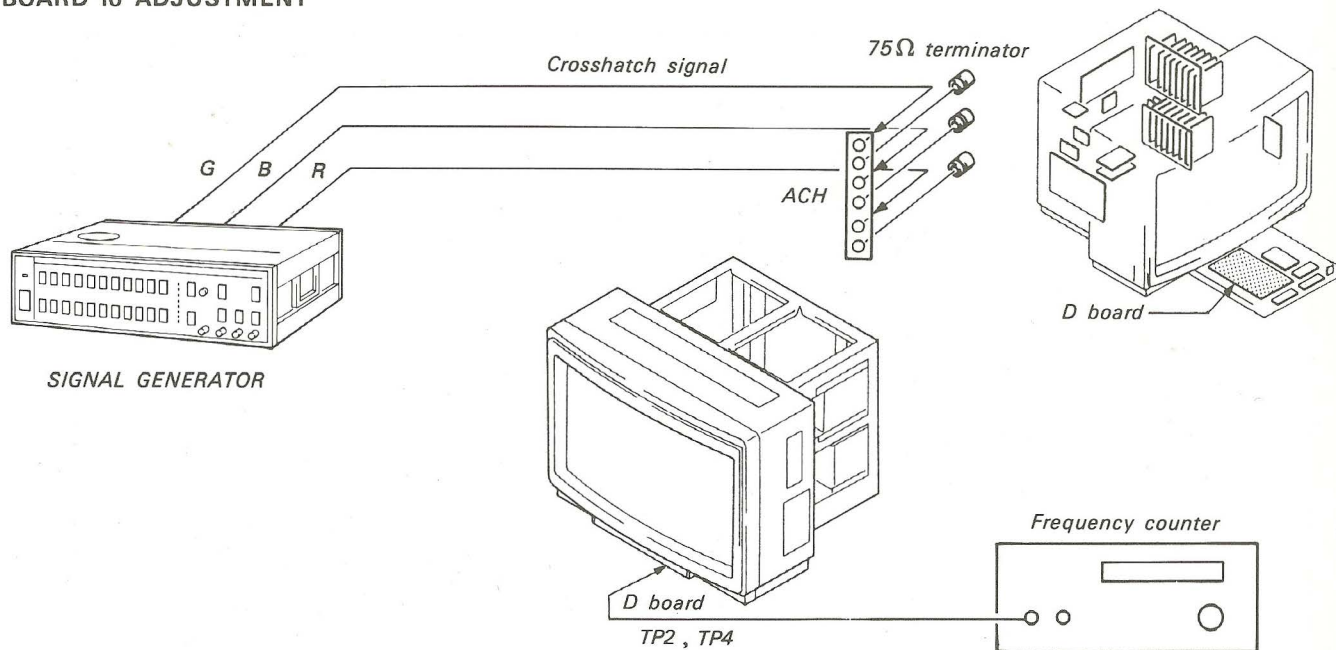


SUB CONTROL PANEL

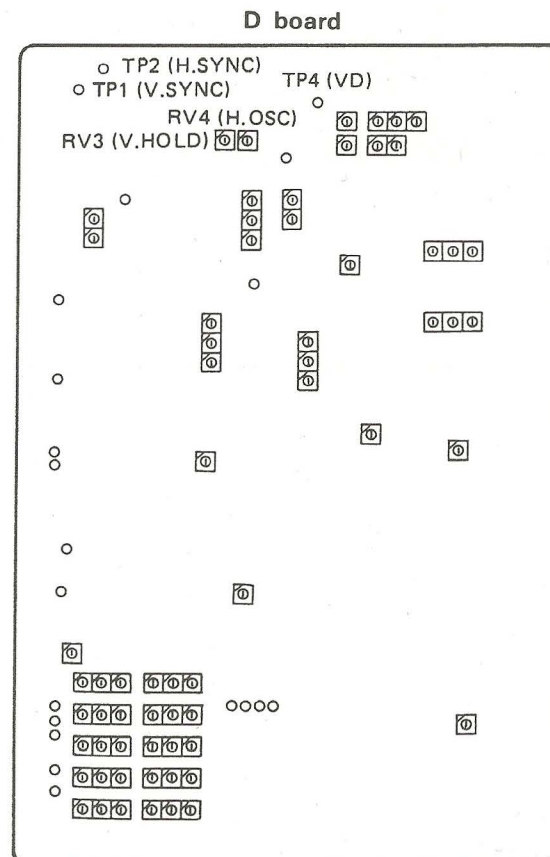


1. D AND DA, DB, E, R, W BOARDS ADJUSTMENT

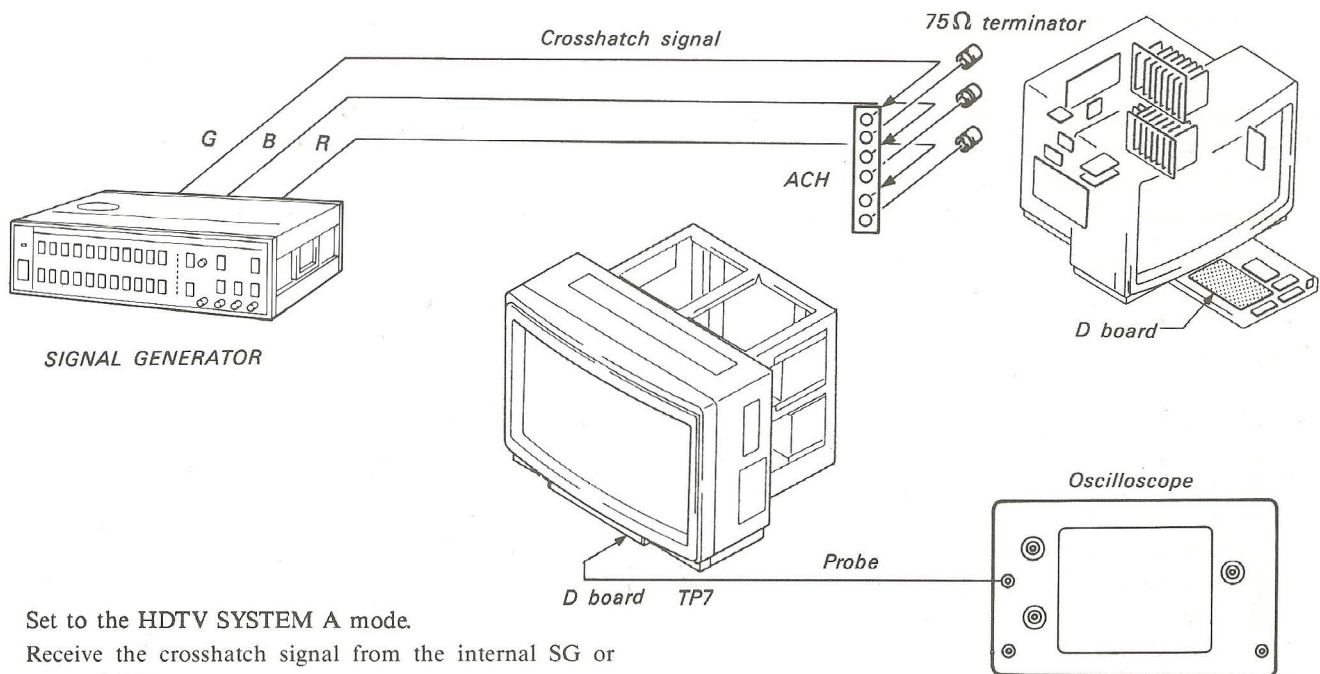
D BOARD fo ADJUSTMENT



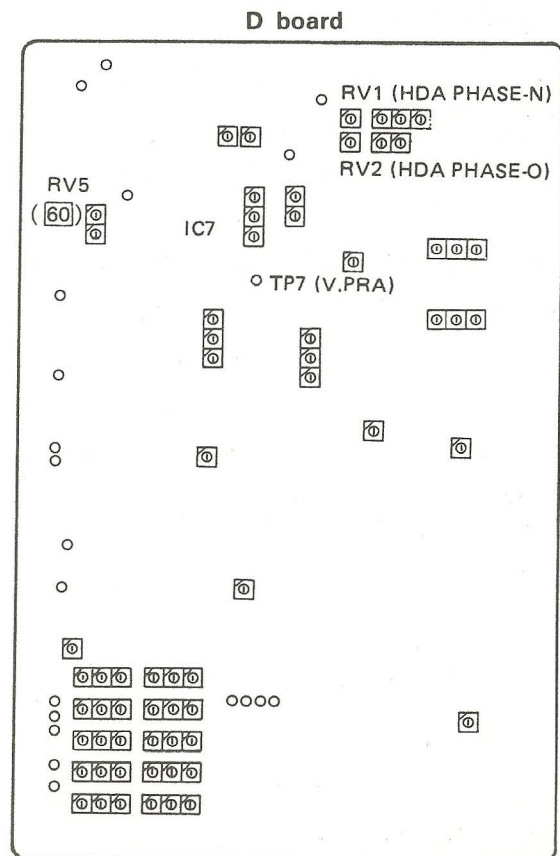
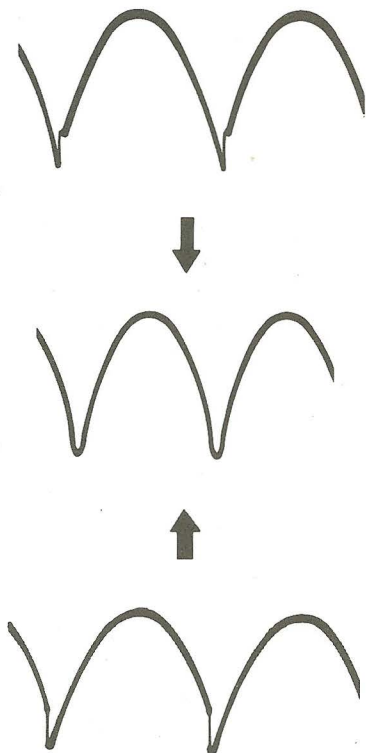
1. Set to the HDTV SYSTEM A mode.
1. Input signal from external SG.
2. Set to GND with clip the TP2 (H SYNC) of D board, and adjust with RV4 (H OSC) so that the image moving sideways stops.
3. Set to GND with clip the TP1 (V SYNC) and adjust with RV3 (V HOLD) so that the vertical frequency of the TP4 (VD) becomes $55 \pm 1.0\text{Hz}$ when the frequency counter is connected to TP4 (VD).



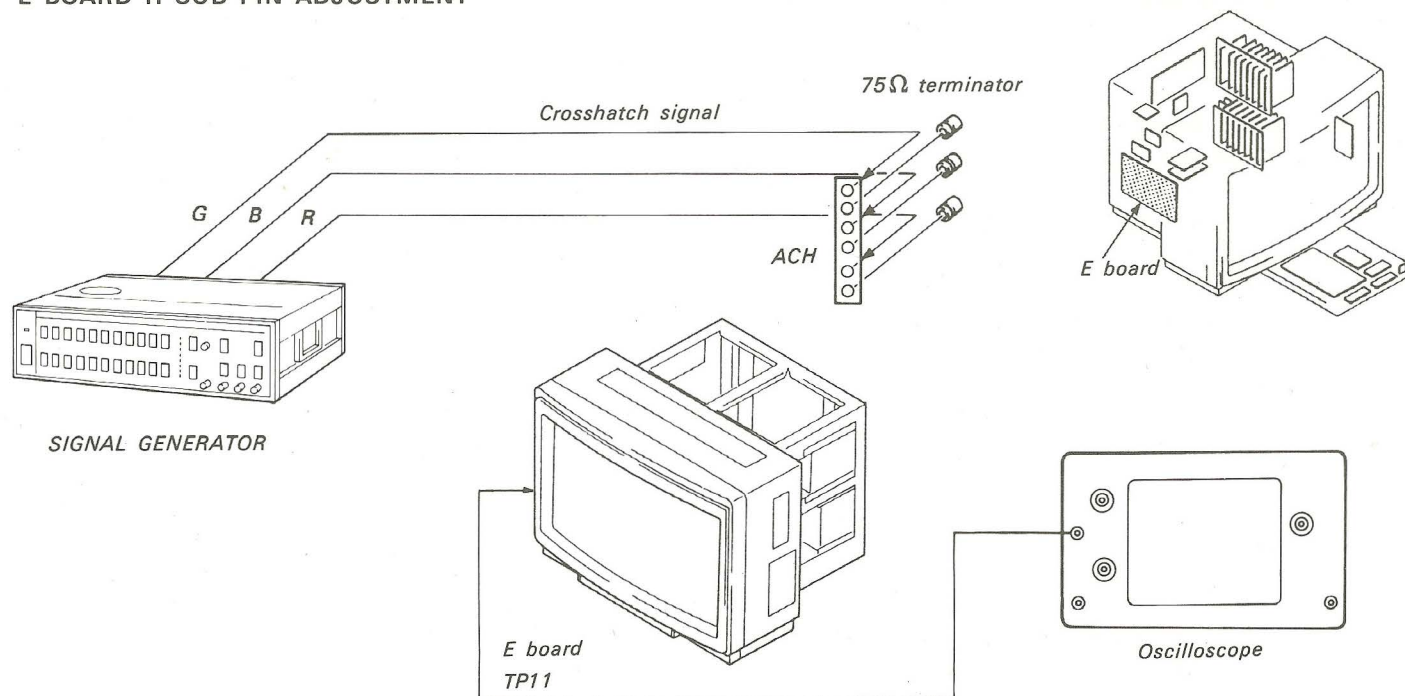
D BOARD V LAMP ADJUSTMENT



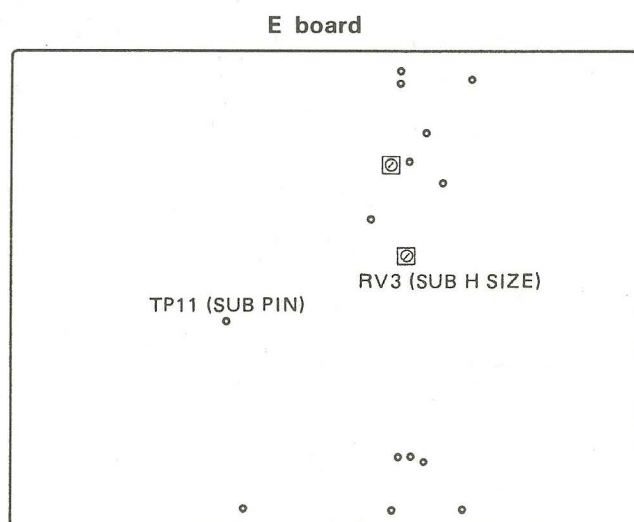
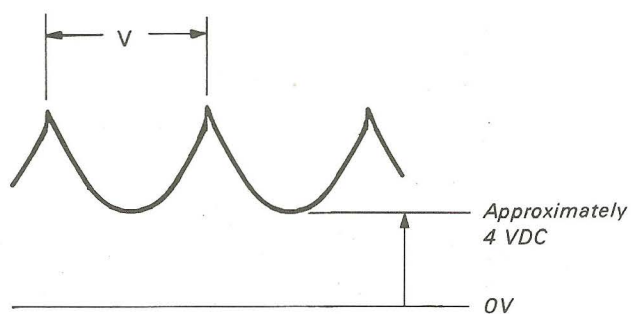
1. Set to the HDTV SYSTEM A mode.
 1. Receive the crosshatch signal from the internal SG or external SG.
- Note:** The picture phase may be different from the internal SG and the receiver image. This phase difference can be matched with HDA H PHASE 16:9 (RV1) or HDA H PHASE 5:3 (setting is by SW on JA board) (RV2) on the subcontrol panel D board.
2. Connect the probe to pin ⑦ (TP7) V.PRA of IC7 of D board, and adjust the VR of ⑥① (RV5) to display the waveform as shown below.



E BOARD H SUB PIN ADJUSTMENT



1. Receive a cross hatch signal (internal HDTV SYSTEM A signal or external signal)
2. Connect probe to TP11 (Q41 collector) on E board.
3. Adjust with RV3 (SUB H SIZE) on E board so that it becomes approximately 4.0 VDC.



D BOARD GEOMETRY CORRECTION ADJUSTMENT

- Press the BRIGHTNESS MANUAL SW. (in the lamp lit state)

1. H CENT Adjustment

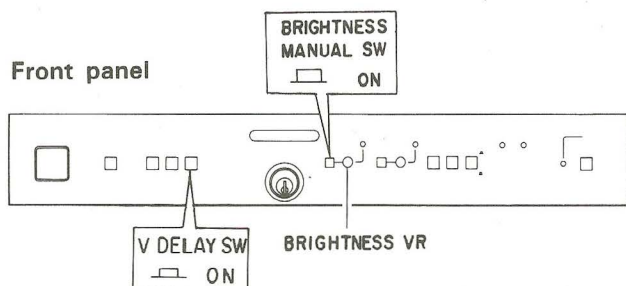
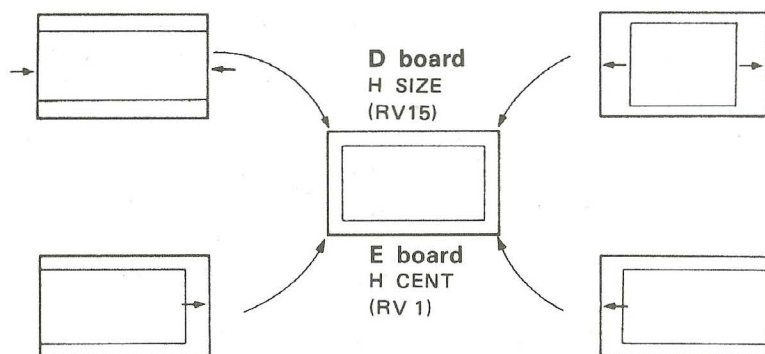
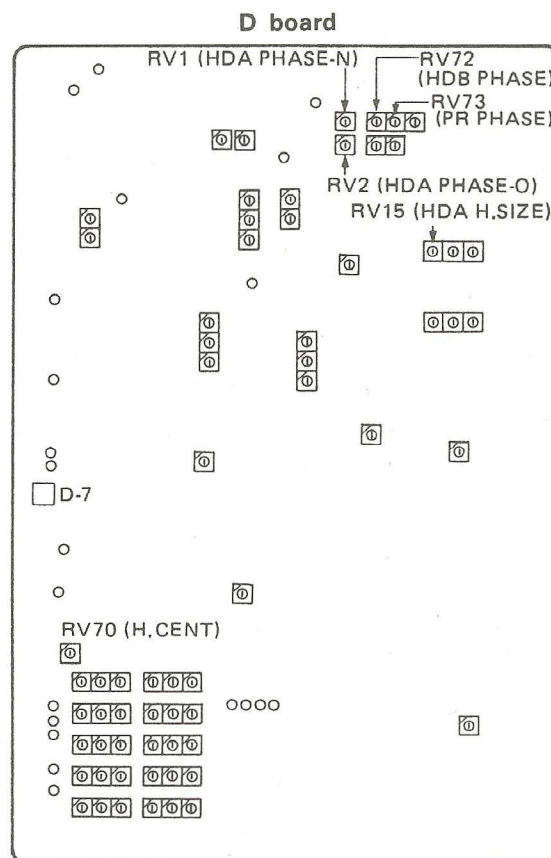
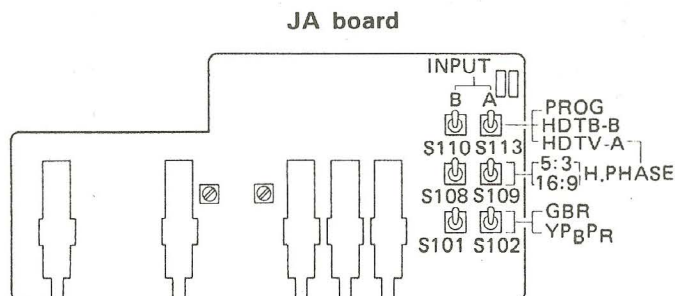
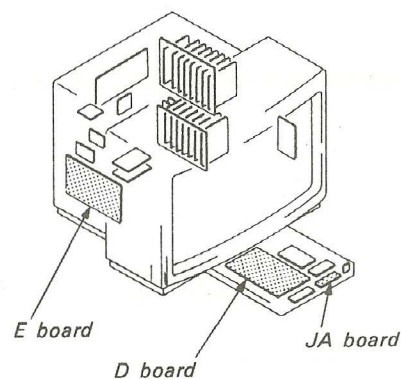
- 1) Turn ON the BRIGHTNESS SW on the front panel and turn VR clockwise.
- 2) With the H SIZE VR (RV15) on the D board, minimize the horizontal size so that raster on the left and right of the screen disappears. (It is best to remove BLK. Remove the D-7 connector and lower the D75 thyristor gate on the E board to GND.)
- 3) Make into V DELAY MODE.
- 4) Turn CENT VR (RV70). Put the D-7 connector and D75 back on the E board. same.

2. Picture Phase Adjustment

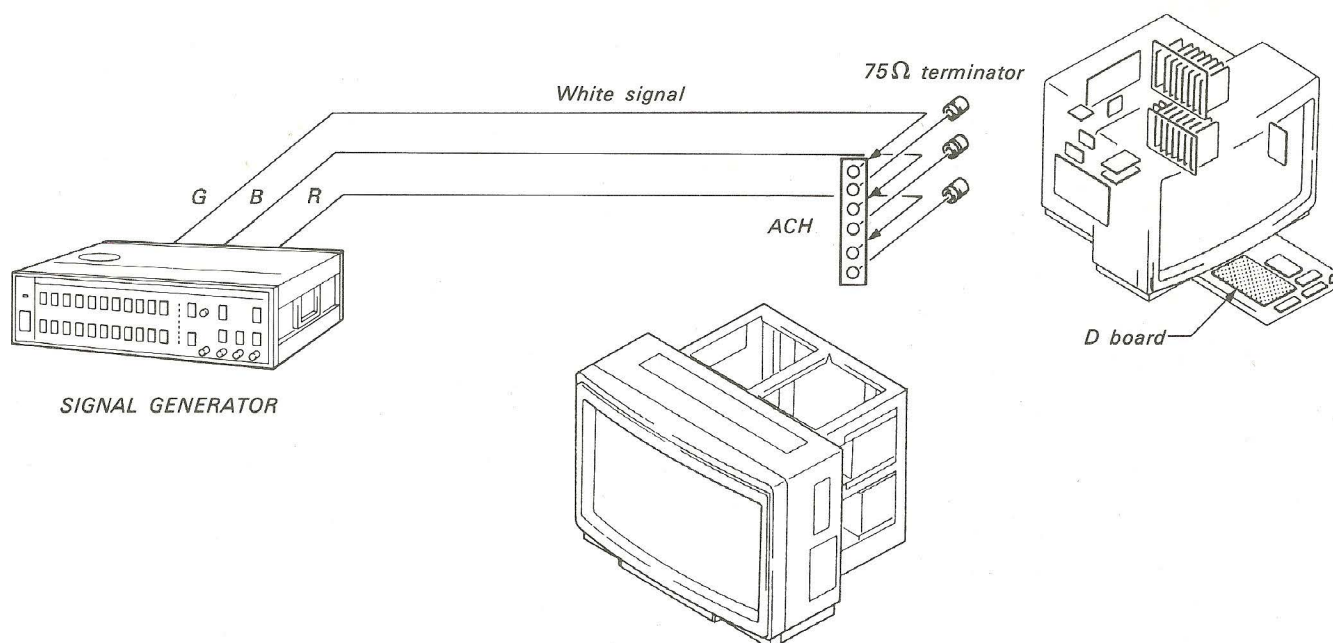
- 1) Set SW101 and SW102 on the JA board at HD SYSTEM A H PHASE 16:9.
- 2) Adjust RV1 (HDA H PHASE 16:9) on the D board so that the image is placed in the center of the raster.
- 3) Set SW101 and SW102 on the JA board at HD SYSTEM A H PHASE 5:3.
- 4) Adjust RV2 (HDA H PHASE 5:3) on the D board so that image is placed in the center of the raster.

Note: Perform adjustment of the picture phase with the external input signal to be actually used.

Note: When the phase of HD, VD and EXT SYNC differs, see the HD and H. SYNC phase adjustment in page 4-46.

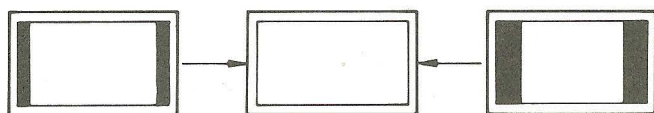


D BOARD HORIZONTAL BLANKING ADJUSTMENT



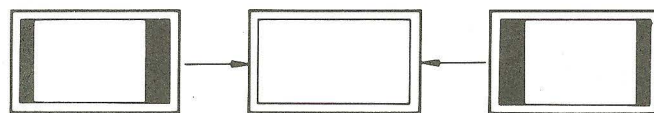
1. Receive the white signal on the picture tube. (internal or external signal)
2. Set to HDTV SYSTEM B. Adjust the horizontal blanking so that the picture occupies the full screen while engaging tracking of HDB H BLANKING WIDTH (RV77) with HDB H BLANKING PHASE (RV76) on the D board. Adjustment is easier with a shorter H size. Return to the original (HDB H RV16) after adjusting.

Adjust the width of the horizontal blanking.



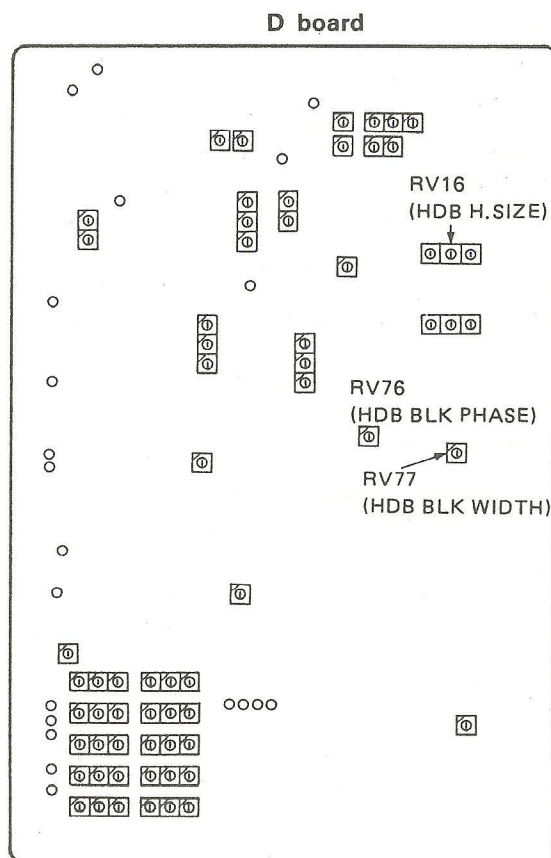
H BLK WIDTH (RV77)

Adjust the phase of the horizontal blanking on both sides.

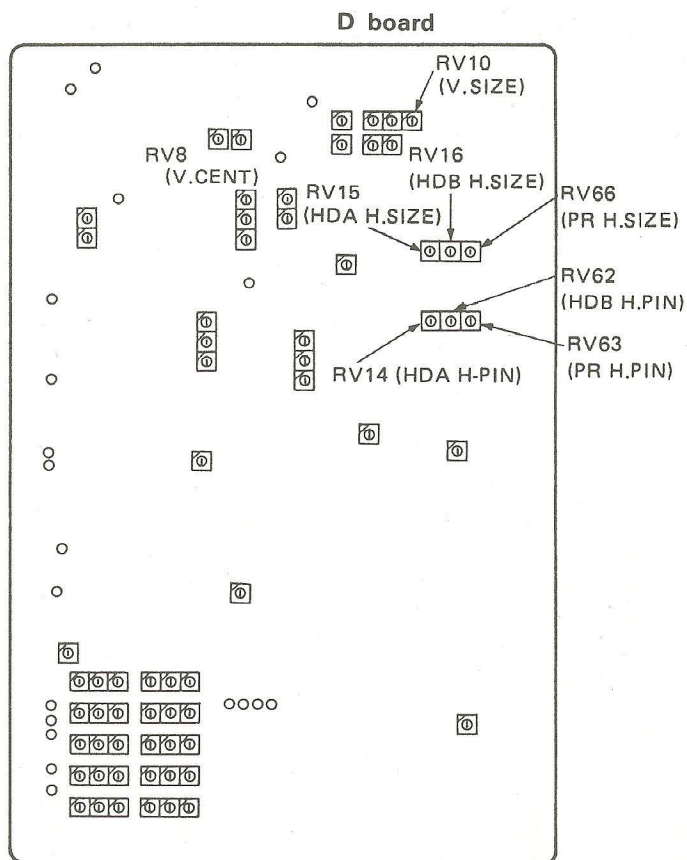
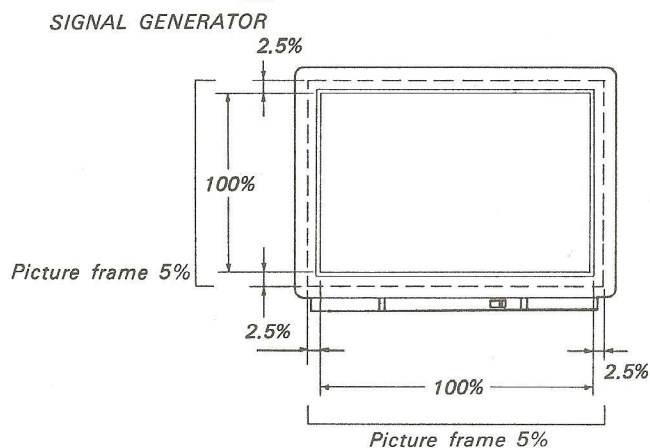
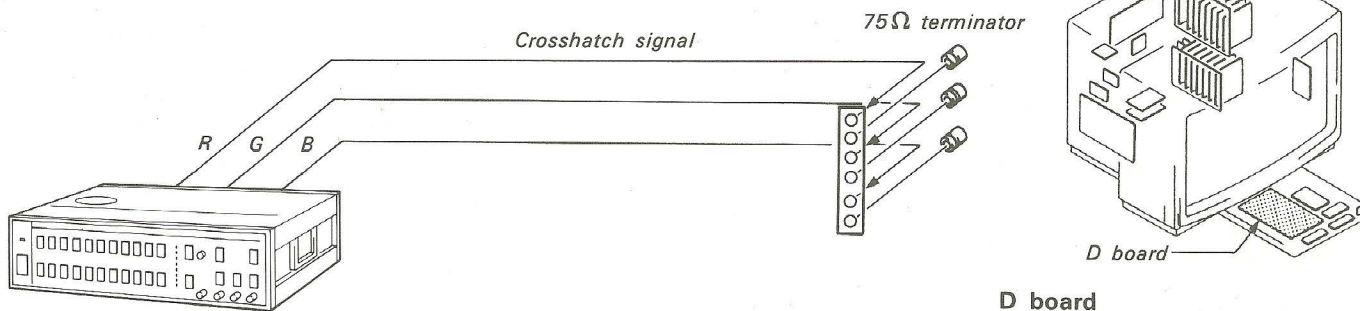


H BLK PHASE (RV76)

No adjustment is necessary for other systems.

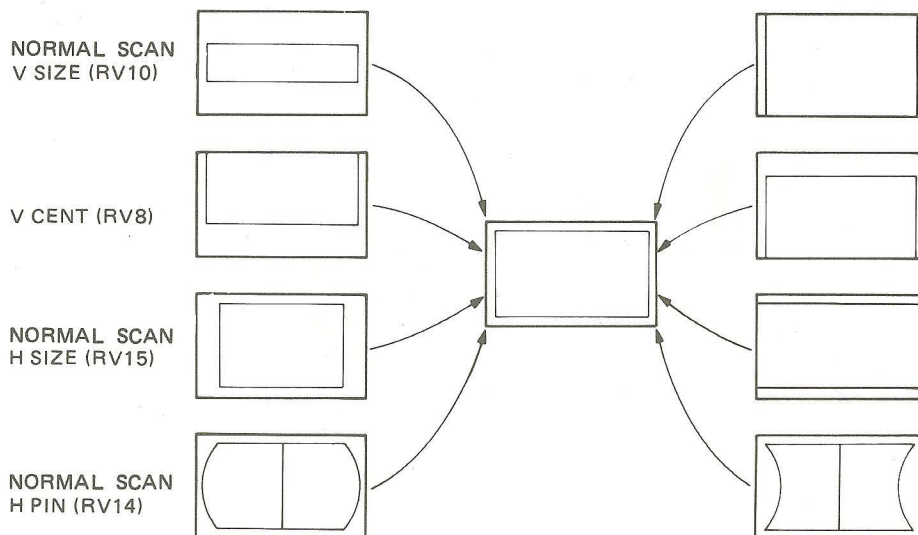


D BOARD HORIZONTAL AND VERTICAL SIZES ADJUSTMENT

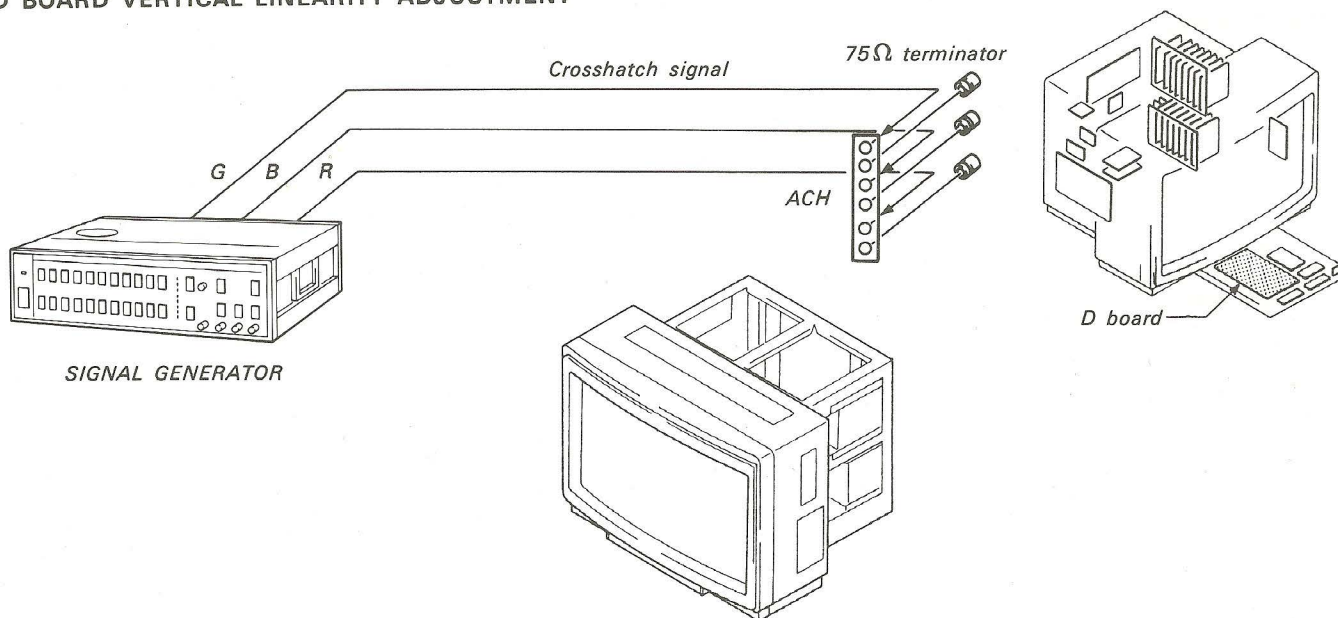


Set to the HDTV SYSTEM A.

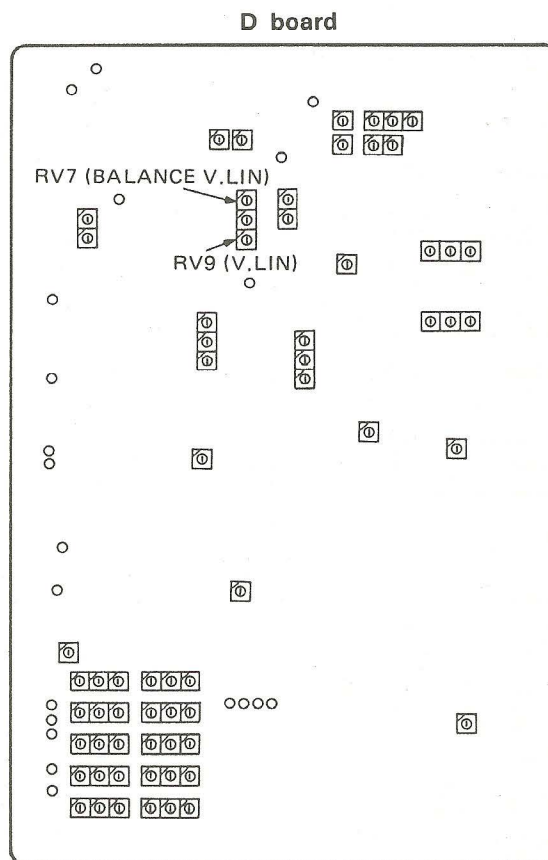
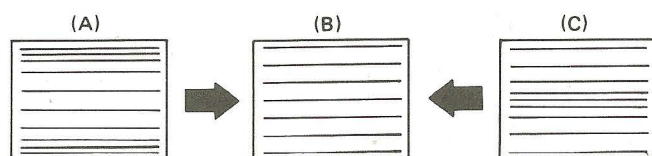
1. Input crosshatch signal (internal or external).
2. Shorten the V size a little with V SIZE (RV10) on the D board, and match CENTER (RV8). Return V SIZE to the original.
3. Adjust the scanning with HDA H SIZE (RV15), HDA H PIN (RV14) and V SIZE (RV10) so that it exceeds the picture frame by 5%.
4. Set to the HDTV SYSTEM B and perform similar adjustments with HDB H SIZE (RV16) and HDB H PIN (RV62).
5. Set to PROG. Now, adjust so that the 5% H overscanning of V has a 4:3 aspect ratio. PR H SIZE (RV66) PR H PIN (RV63).



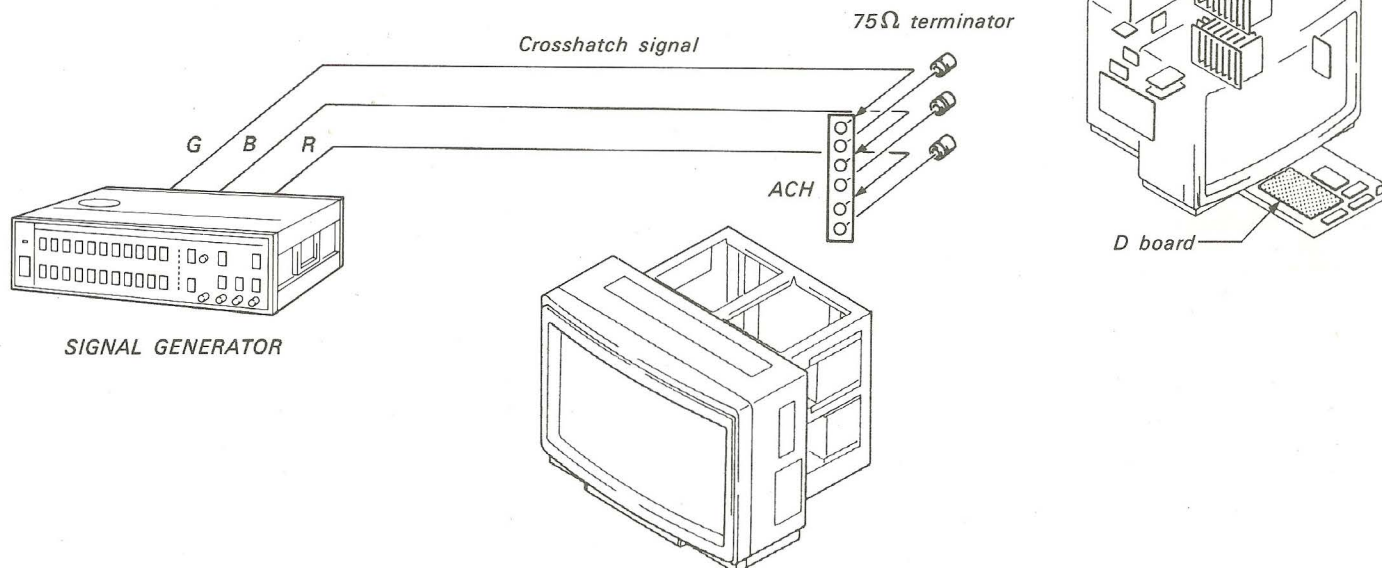
D BOARD VERTICAL LINEARITY ADJUSTMENT



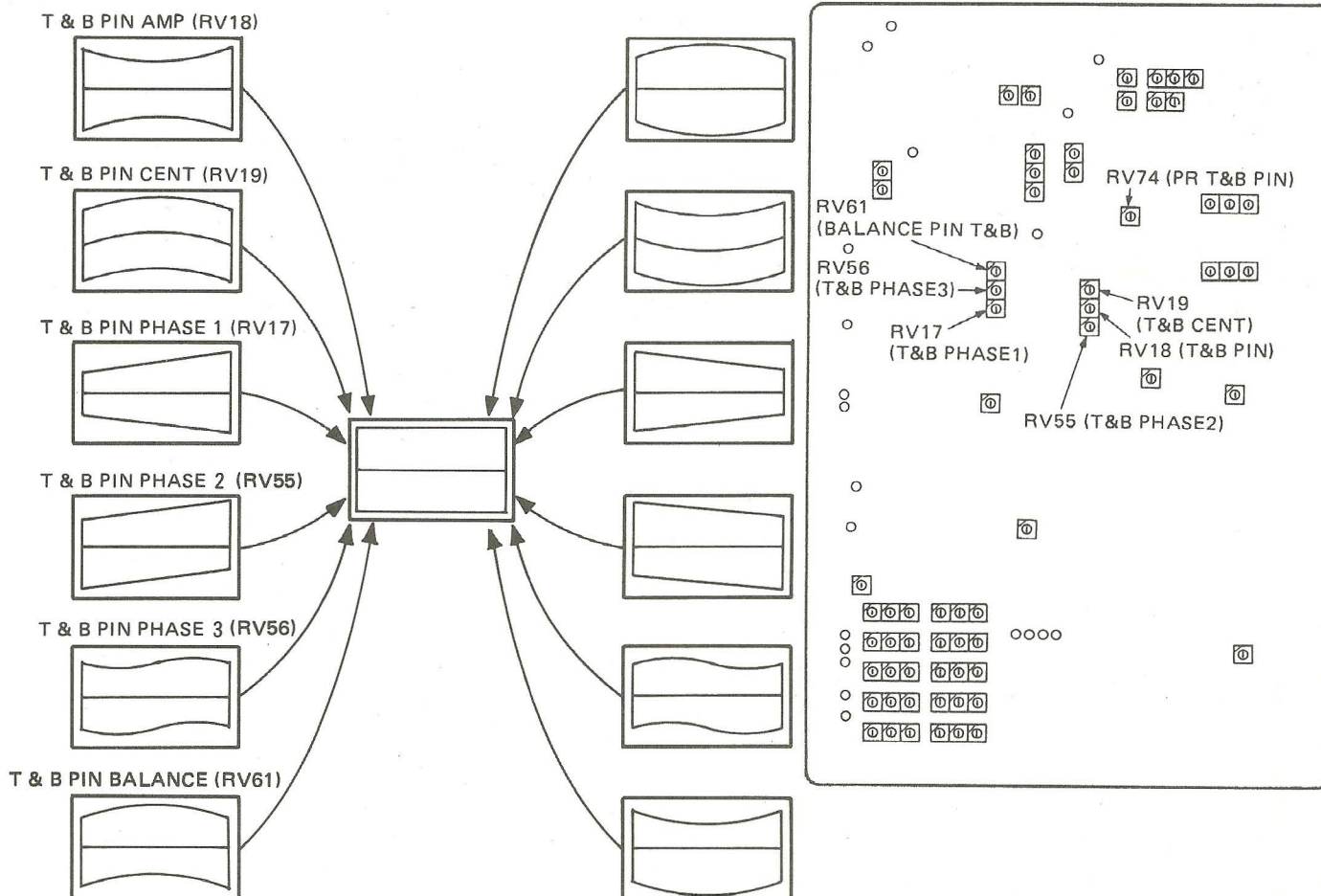
1. Input crosshatch signal (internal or external signal).
2. Turn V AMP (RV9) on the D board fully counterclockwise.
3. Make the upper and lower sections become in symmetry with V LIN PHASE (RV7) (A).
4. Match the linearity so that it becomes at regular intervals overall with V LIN AMP (RV9) (A) (B) (C).



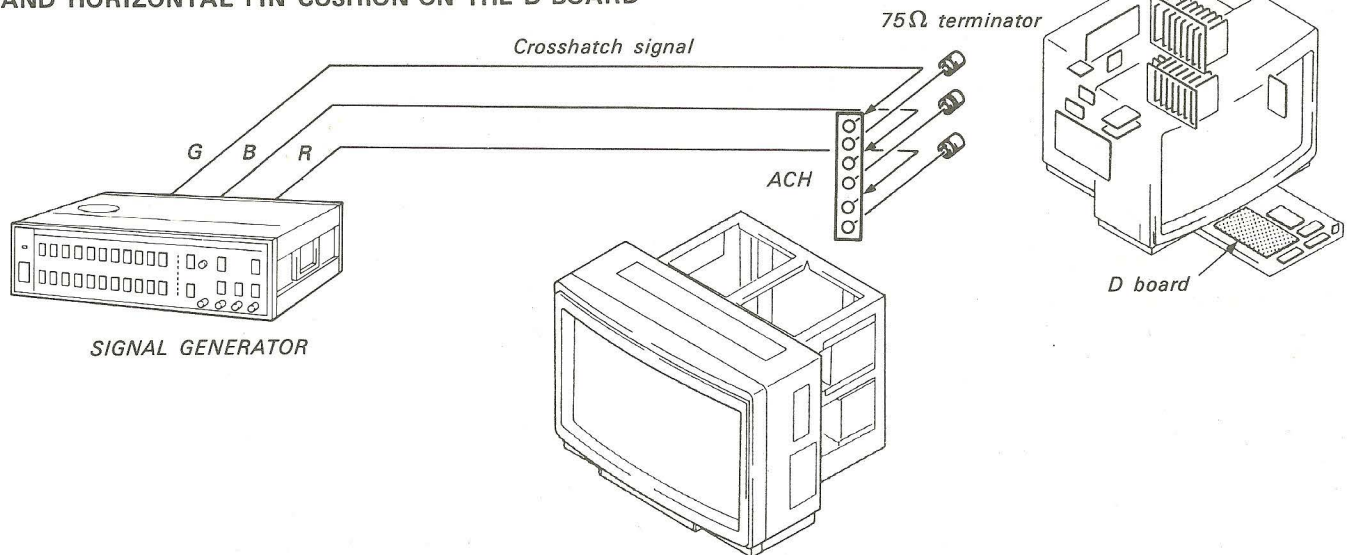
ADJUSTMENT OF TOP AND BOTTOM PINS ON THE D BOARD



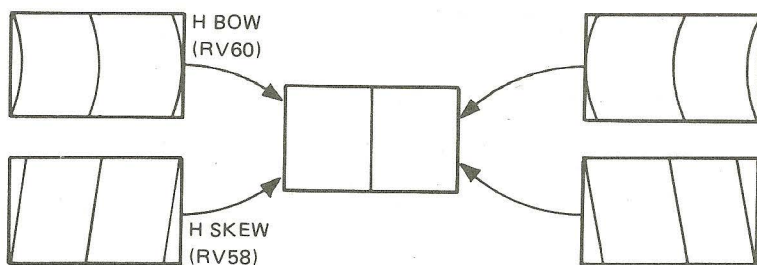
1. Input crosshatch signal (internal or external signal).
2. While engaging tracking of T & B PIN AMP (RV18), T & B PIN CENT (RV19), T & B PIN PHASE 1 (RV17), T & B PHASE 2 (RV55), T & B PIN PHASE 3 (RV56) and T & B PIN BALANCE (RV61) on the D board, match the TOP and BOTTOM pins.
3. Set to PROG and adjust the top and bottom pins with PR T&B PIN (RV74).



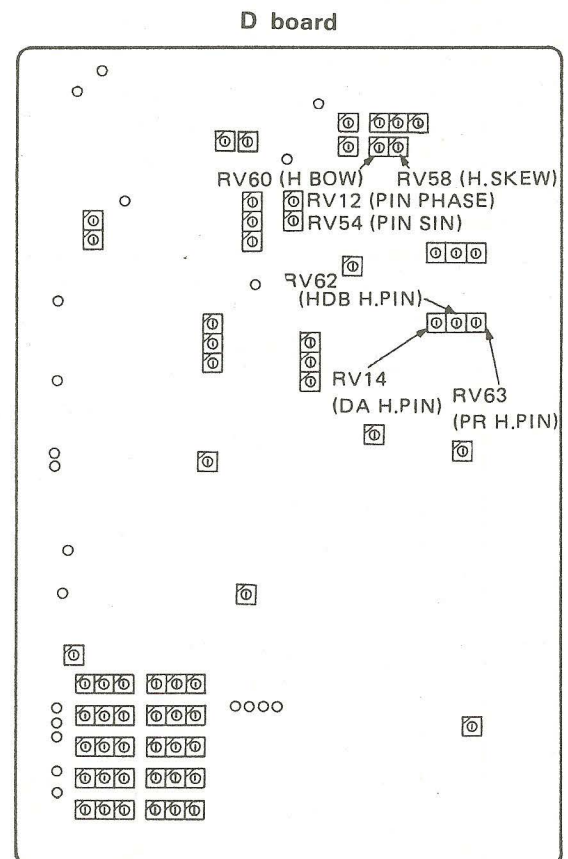
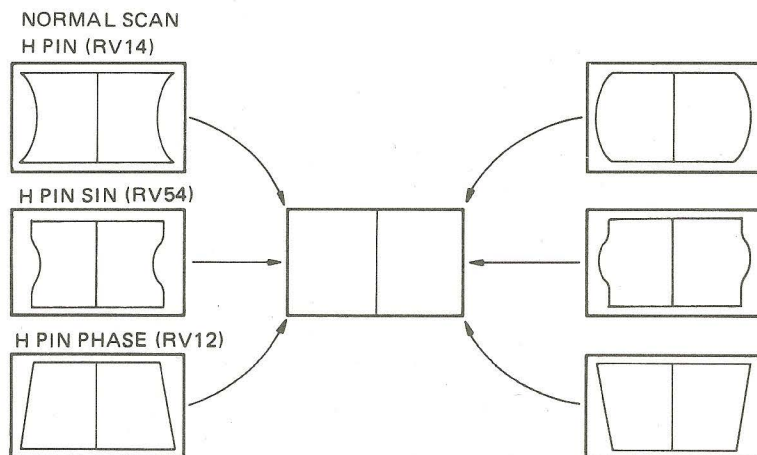
ADJUSTMENT OF DISTORTION OF Y AXIS CENTER AND HORIZONTAL PIN CUSHION ON THE D BOARD



1. Input crosshatch signal (internal or external signal).
2. Adjust Y axis center with H BOW (RV60) and H SKEW (RV58) on the D board.

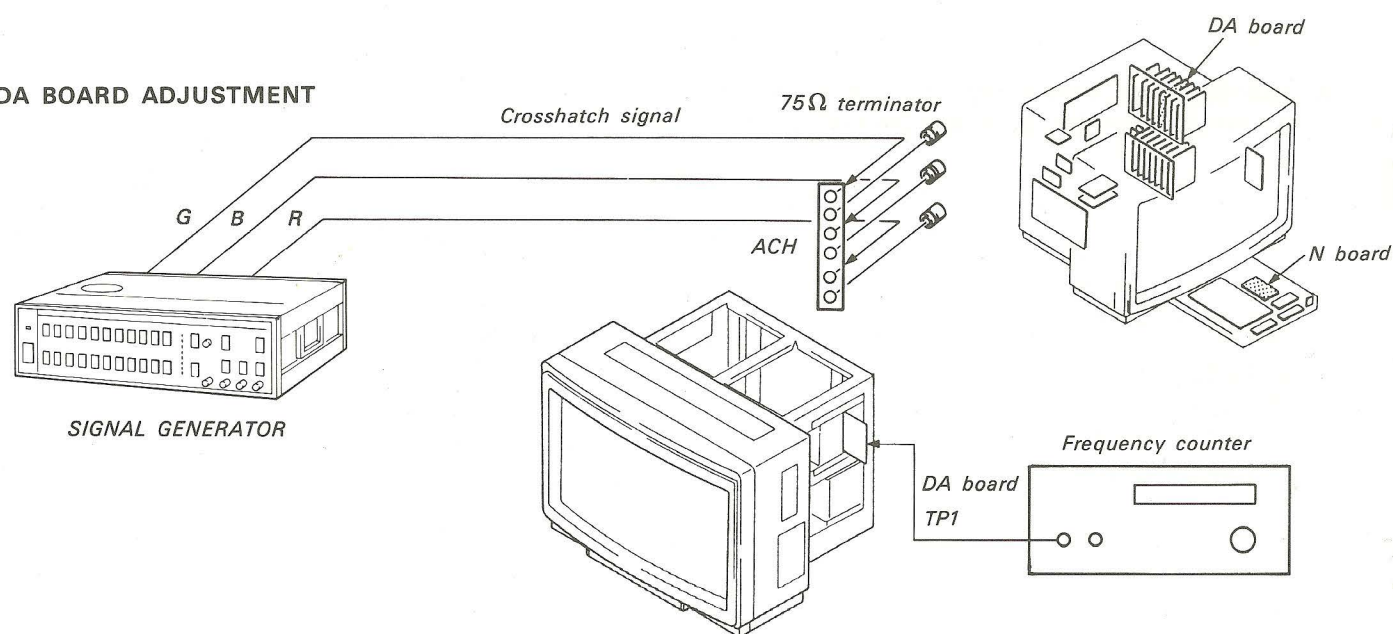


3. Adjust the distortion of the left and right pins with HDA H PIN (RV14), H PIN SIN (RV54) and H PIN PHASE (RV12).



4. Set to HDTV SYSTEM B and adjust the left and right pins with HDB H PIN (RV62).
5. Set to PROG SYSTEM B and adjust the left and right pins with PR H PIN (RV63).

DA BOARD ADJUSTMENT



- Input crosshatch signal (internal or external signal).

RV1 adjustment

1. Connect with clip TP21 and GND on the DA board.
2. Connect frequency counter to TP1 (VD) on the DA board and adjust with RV1 so that it becomes 48 ± 1.0 MHz.

RV2 adjustment

1. Match the points shown in Fig. 1 of the horizontal direction convergence.
2. Shift the convergence as shown in Fig. 2 with the respective keys of MODE, FUNCTION, OPERATE, and CURSOR/DATA of the control unit of the sub control panel.
3. When the RV2 on the DA board is turned, the position of the convergence points alters as in (A) and (B) of Fig. 3. Turn RV2 so that these points coincide with the upper section of the screen.

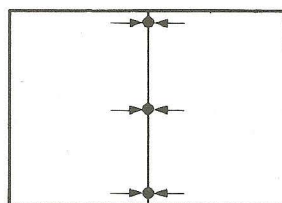


Fig. 1

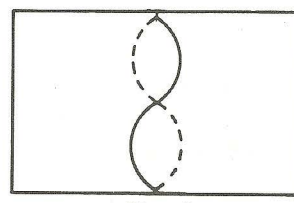


Fig. 2

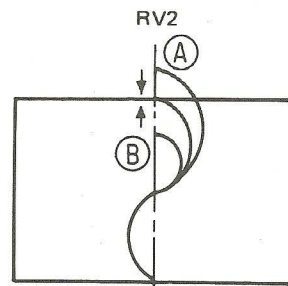
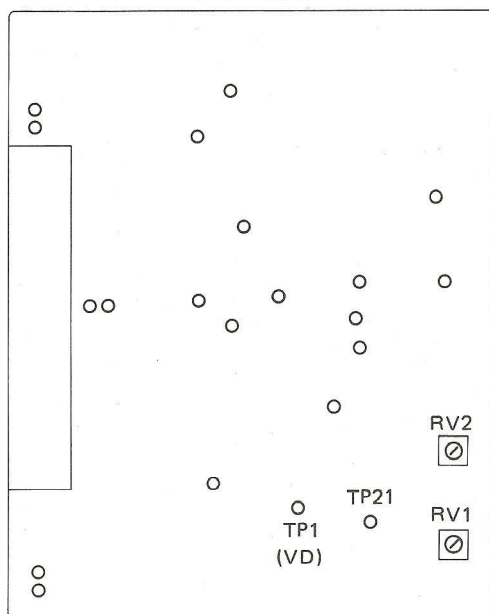
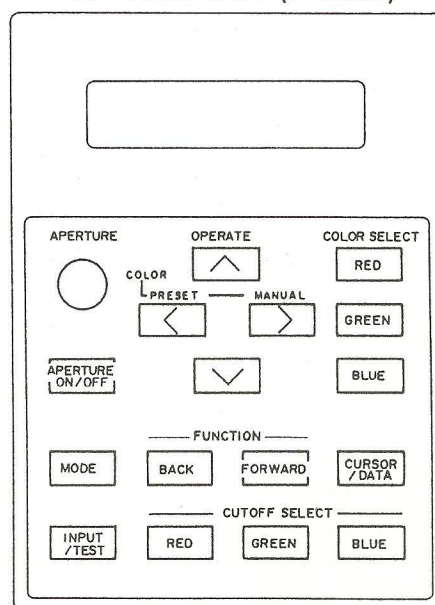


Fig. 3

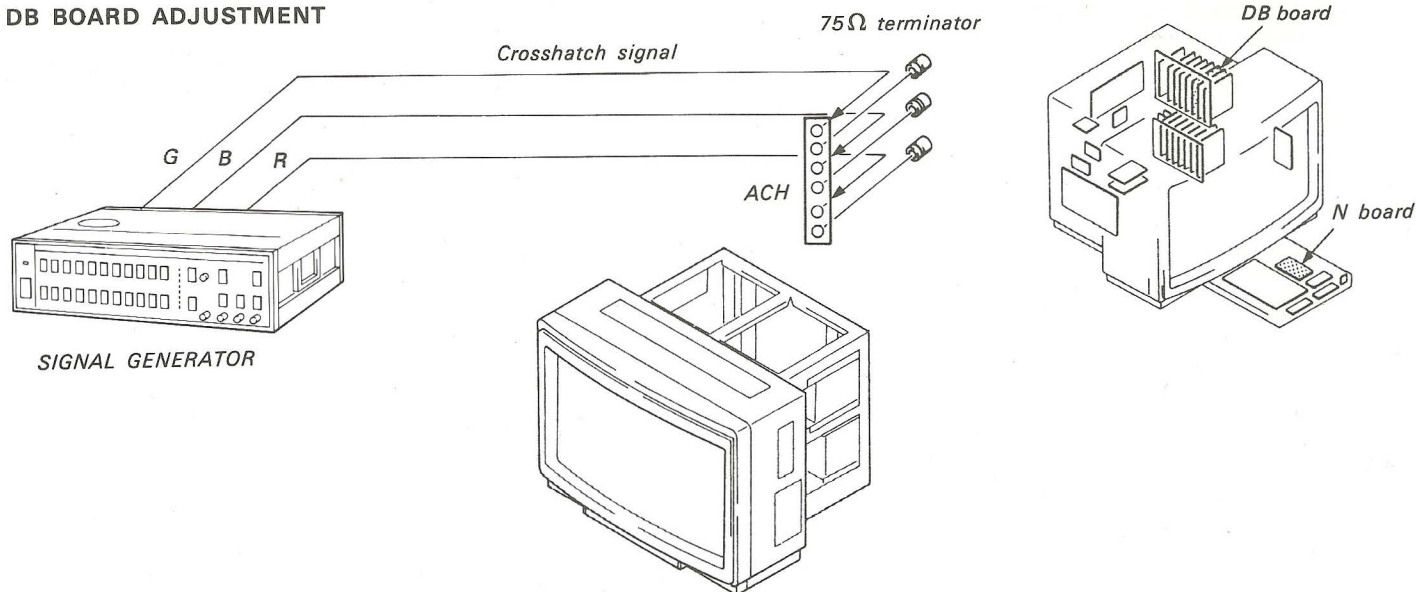
DA board



CONTROL UNIT (N board)



DB BOARD ADJUSTMENT



- Input crosshatch signal (internal or external signal).

SW4 adjustment

1. Match the points of vertical convergence as shown in Fig. 1.
2. Shift the convergence as shown in Fig. 2 with the respective keys of MODE, FUNCTION, OPERATE and CURSOR/DATA of the control unit of the sub control panel.
3. With the setting of the dip switch (SW4), the horizontal cycle phase alters as shown in Fig. 3. Setting can be made from 0 to 15 and as the phase alters as in (B) of Fig. 3 when 0, (A) of Fig. 3 when 15, match to center of screen by setting. The setting of SW4 is shipped in the state of Fig. 4.

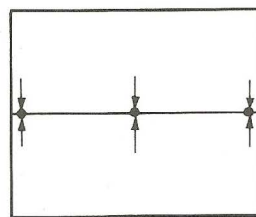


Fig. 1

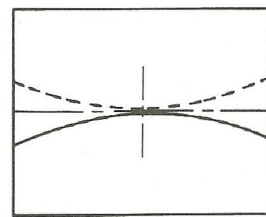


Fig. 2

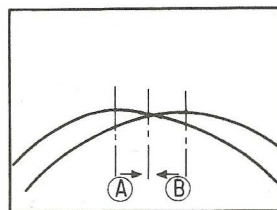
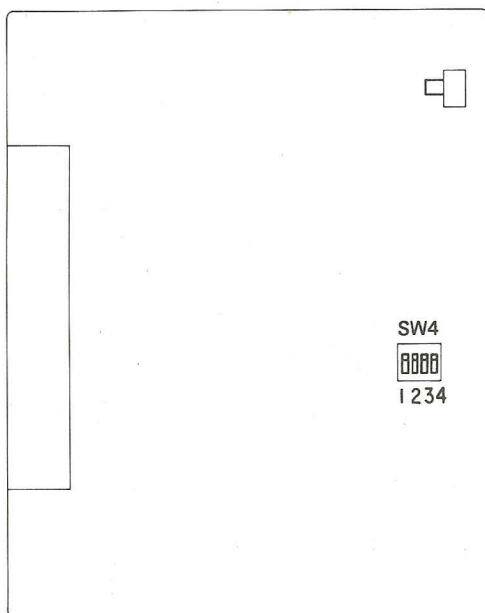


Fig. 3

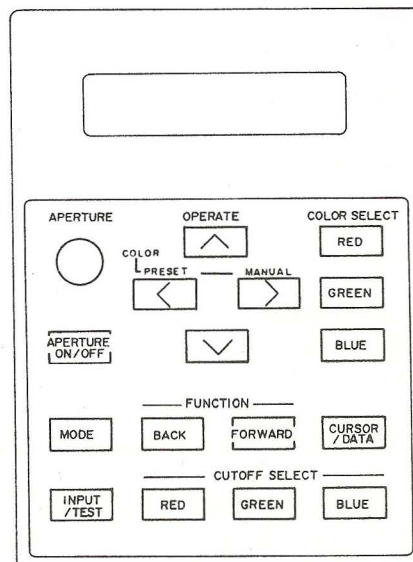
1	ON
2	OFF
3	ON
4	ON

SW4
Fig. 4

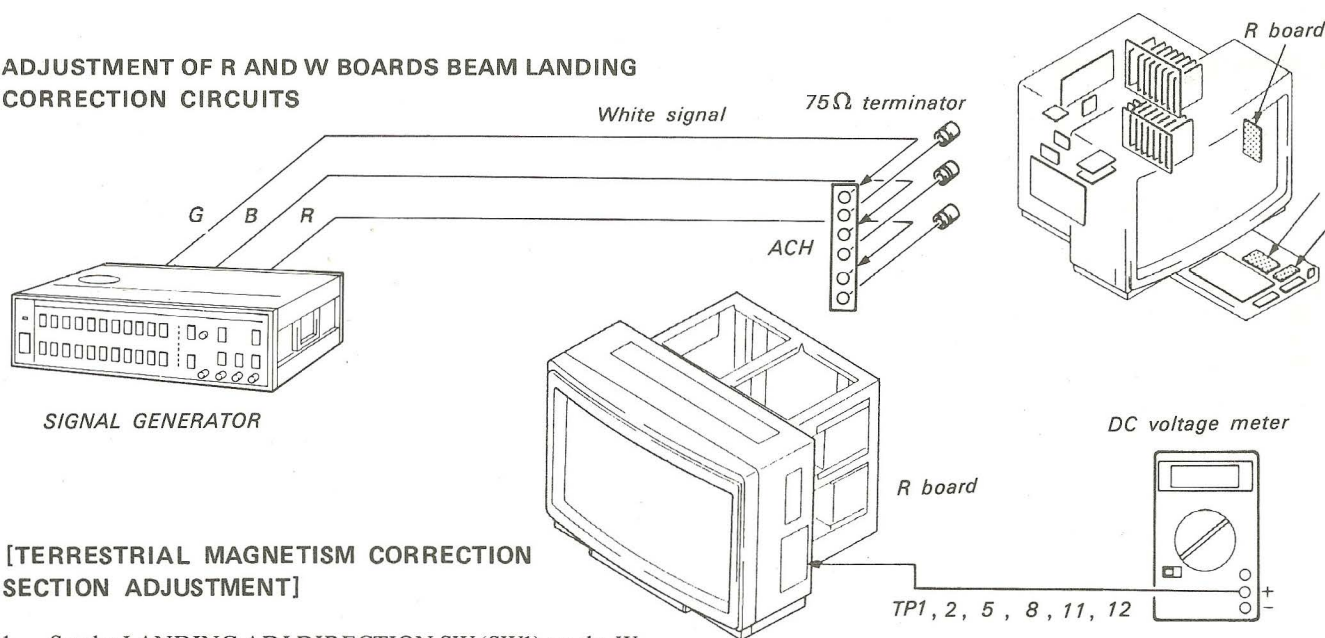
DB board



CONTROL UNIT (N board)



ADJUSTMENT OF R AND W BOARDS BEAM LANDING CORRECTION CIRCUITS



[TERRESTRIAL MAGNETISM CORRECTION SECTION ADJUSTMENT]

1. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to SE (6).
2. Connect a DC voltmeter to TP1 of the R board and adjust the RV1 so that the output voltage becomes 2.00 ± 0.01 Vdc.
3. Set the LANDING ADJ DIRECTION SW to S (8).
4. Connect a DC voltmeter to TP2 on the R board and adjust the RV2 so that the output voltage becomes 3.00 ± 0.01 Vdc.

Note: This setting value is for 0.25 gauss of the horizontal section of the terrestrial magnetism. If the horizontal section value differs, make the adjustment in reference to section 4-5. SET-UP ADJUSTMENT.

[ADJUSTMENT OF THE BEAM CURRENT CORRECTION SECTION]

1. Cut off R, G, B together with the CUT OFF SELECT on the sub control panel of control unit (N board).
2. Connect a DC voltmeter to TP5 on the R board and adjust the RV3 so that the output becomes 60 ± 20 mV.
3. Receive the white signal (internal or external signal).
4. Turn on the CONTRAST MANUAL SW on the front panel and adjust the CONTRAST control so that the TP5 output becomes 2.2 Vdc.
5. Connect TP5 and TP6, TP5 and TP7, with short clips, respectively.
6. Connect a DC voltmeter to TP8 and adjust the RV4 so that the output becomes 0 ± 0.1 Vdc.
7. Connect TP5 and TP9, TP5 and TP10, with short clips, respectively.
8. Connect a DC voltmeter to TP11 and adjust the RV5 so that the output becomes 0 ± 0.1 Vdc.

[OPERATION CONFIRMATION METHOD OF LANDING ADJUSTMENT (W BOARD)]

1. Receive the white signal (internal or external signal).
2. Select pure green color by the CUT OFF SELECT on the N board and match the LANDING ADJ DIRECTION SW (SW1) to E (4).
3. Set to ON both the LANDING ADJ ON/OFF SW (SW2) and LANDING FINE ADJ ON/OFF SW (SW3) on the W board.
4. Set the volumes RV7 to RV12 to the mechanical center.

5. Confirm that the left upper corner becomes redish when RV1 is turned counterclockwise and it becomes blueish when turned clockwise. Keep the poor purity as it is.
6. Confirm the same with RV2 to RV6 and keep them in poor purity.
7. Set the LANDING FINE ADJ ON/OFF SW (SW3) to OFF and confirm that the purity becomes good.
8. Set the LANDING FINE ADJ ON/OFF SW (SW2) to ON.
9. Set the LANDING FINE ADJ ON/OFF SW (SW2) to OFF and confirm that the purity becomes good.
10. Set the LANDING ADJ ON/OFF SW to ON.
11. Set the volumes RV1 to RV6 to the mechanical center.
12. Set the LANDING FINE ADJ ON/OFF SW (SW3) to OFF.
13. Turn the LANDING ADJ DIRECTION SW (SW1) by one step at a time and confirm that the screen color smoothly changes.

W board

Note:

RV1	RV3	RV5
RV2	RV4	RV6

- The screen corresponds to the adjustment volumes (RV1 to RV6).
- For the adjustment method of volumes RV7 to RV12, see section 4-5. SET-UP ADJUSTMENT.

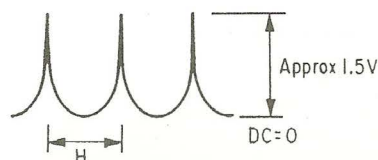
[ADJUSTING THE ELECTROMAGNETIC QUADRUPLE ON THE U BOARD]

Connect an oscilloscope to both ends of R22 and check the waveforms.

Turn RV2 to the maximum setting where the parabolic waveforms are not distorted.

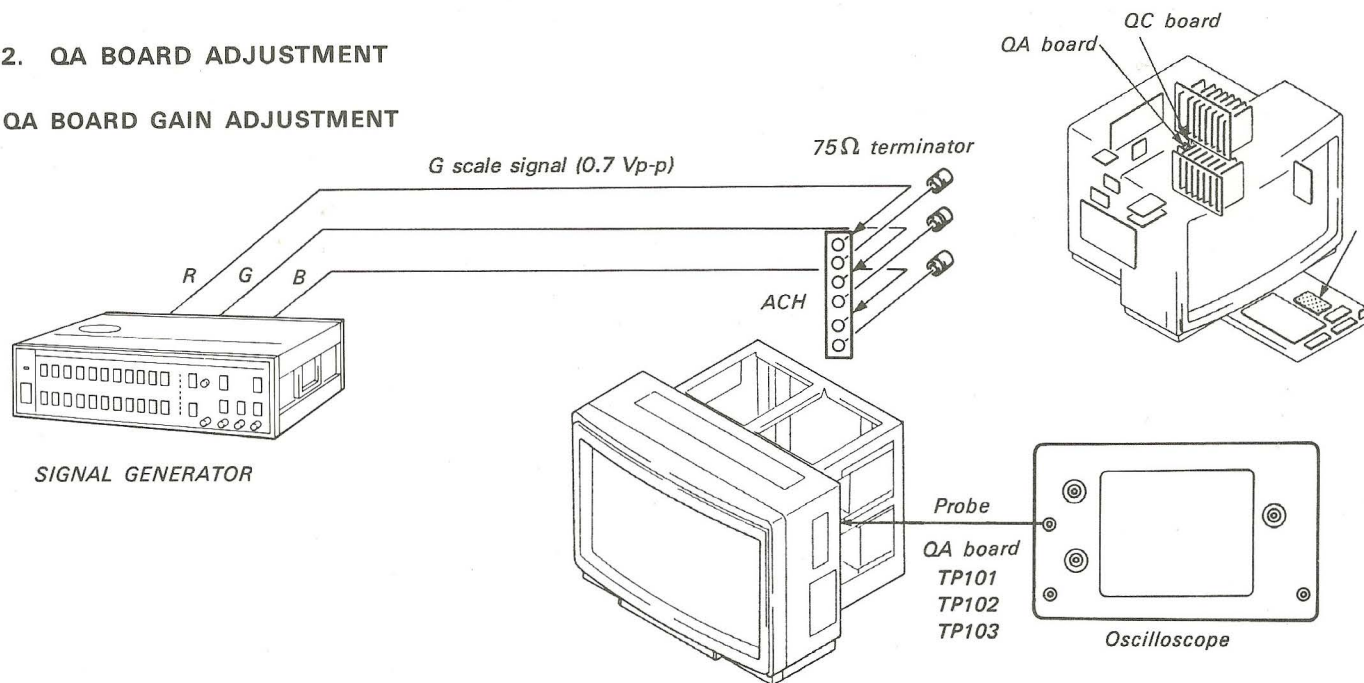
Turn RV1 and determine the bias point where the bottoms of the parabolas become GND.

This completes the adjustment.

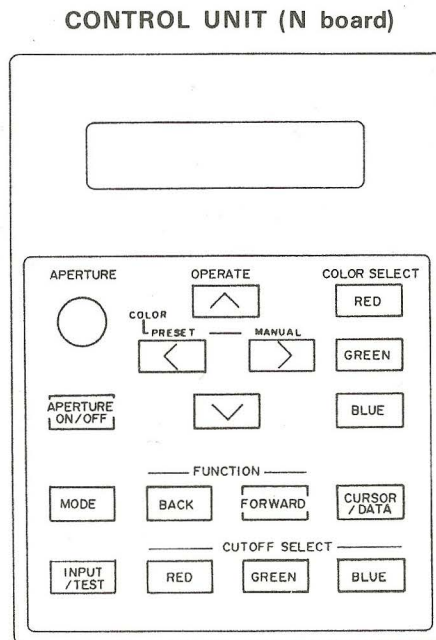
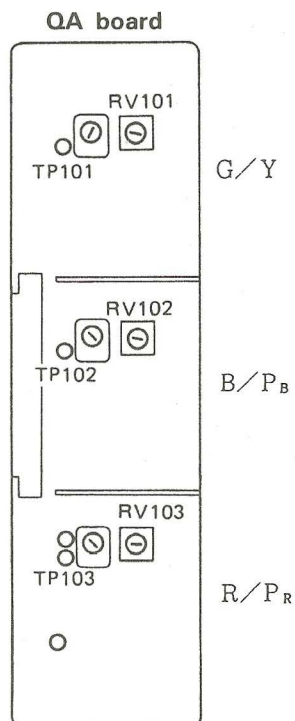
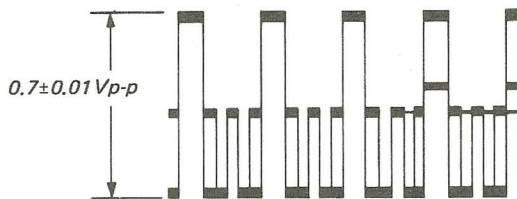


2. QA BOARD ADJUSTMENT

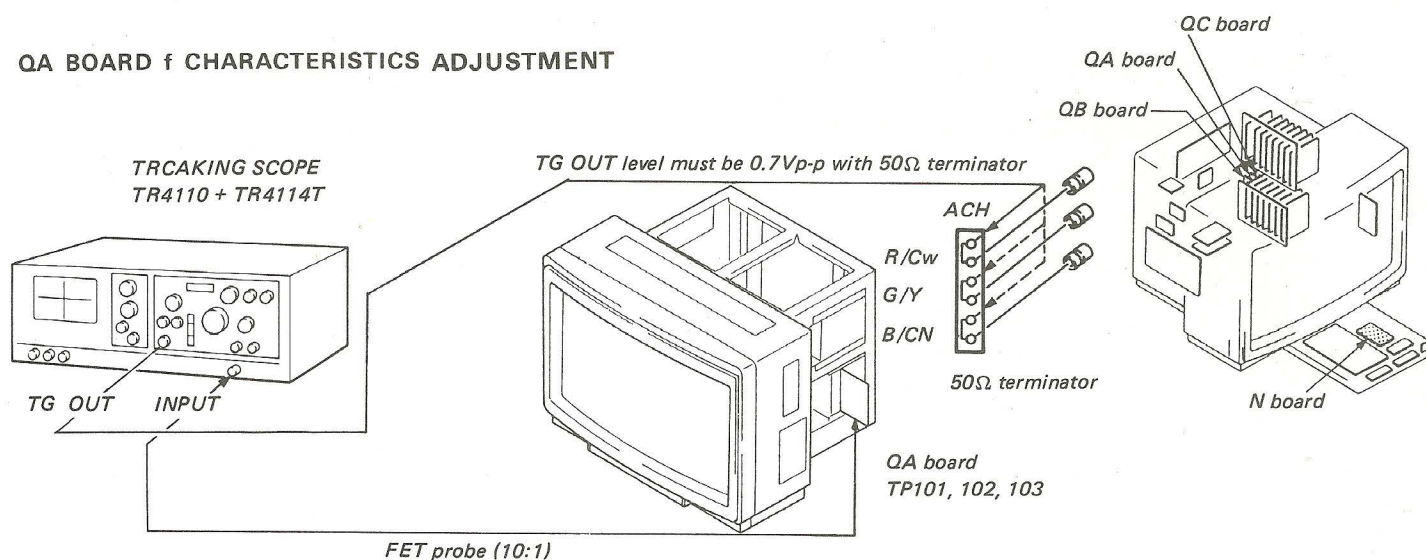
QA BOARD GAIN ADJUSTMENT



1. Remove the QC board.
2. Input the G SCALE signal.
3. Cut off all RED, GREEN and BLUE of the control unit (N board).
4. Adjust the video signal level (excluding the SYNC signal level) section of the TP101, TP102 and TP103 on the QA board to 0.7 ± 0.01 Vp-p using RV101, RV102 and RV103.



QA BOARD f CHARACTERISTICS ADJUSTMENT



1. Cut off all RED, GREEN and BLUE of the control unit (N board).
2. Input the output signal of the tracking generator to the GREEN/Y terminal. Match the f characteristics of TP101 with CV101 to ± 0.5 dB in the range of 60 to 30 MHz.
3. Input the output signal of tracking generator to the BLUE/P_B terminal. Match the f characteristics of TP102 with CV102 to ± 0.5 dB in the range of 60 to 30 MHz.
4. Input the output signal of tracking generator to the RED/P_R terminal. Match the f characteristics of TP103 with CV103 to ± 0.5 dB in the range of 60 to 30 MHz.

[QB BOARD f CHARACTERISTICS ADJUSTMENT]

[QB BOARD f CHARACTERISTICS ADJUSTMENT]

Input the signal to the QB board. Other measurements are the same with that on the QA board f characteristics adjustment.

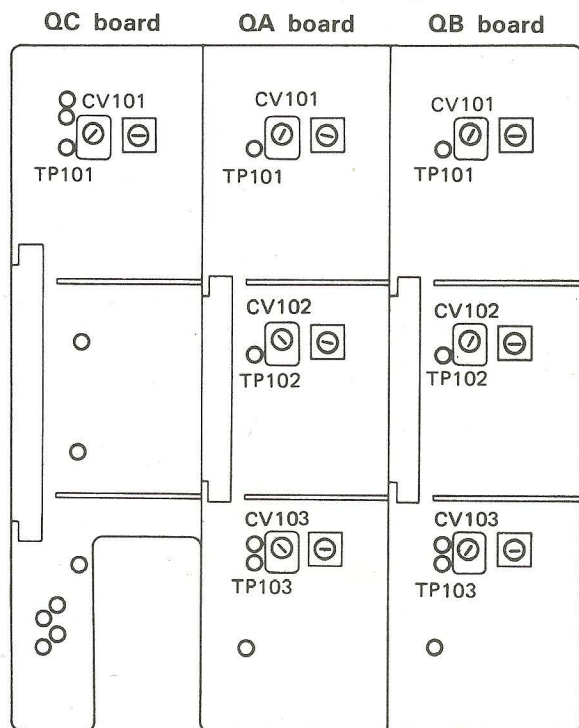
[QC BOARD GAIN ADJUSTMENT]

Input signal to EXT SYNC on QC board. TP is 101 and RV is 101 and other measurements are the same with that on the QA board gain adjustment.

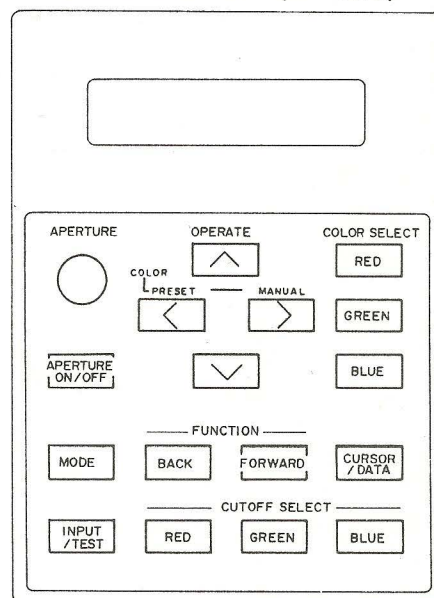
[QC BOARD f CHARACTERISTICS ADJUSTMENT]

Input the signal to EXT SYNC on the QC board. TP is 101 and RV is 101, match to adjustment range of ± 1 dB. Other measurements are the same with that on the QA board f characteristics adjustment.

[QB BOARD GAIN ADJUSTMENT]
Input the signal to the QB board. Other measurements are the same with that on the QA board gain adjustment.

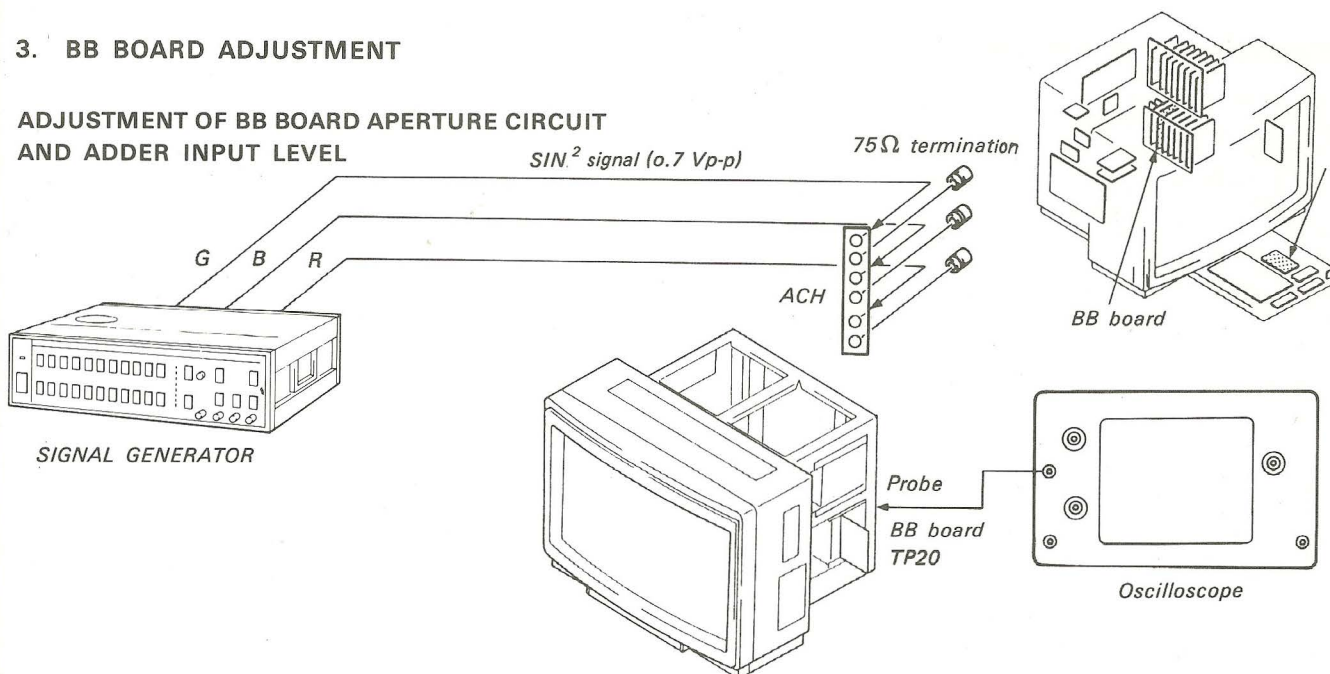


CONTROL UNIT (N board)

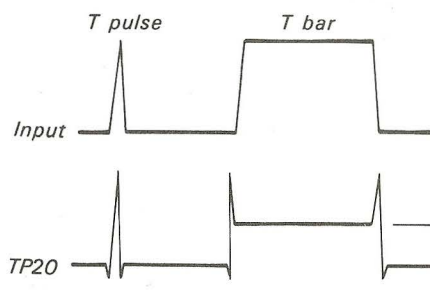


3. BB BOARD ADJUSTMENT

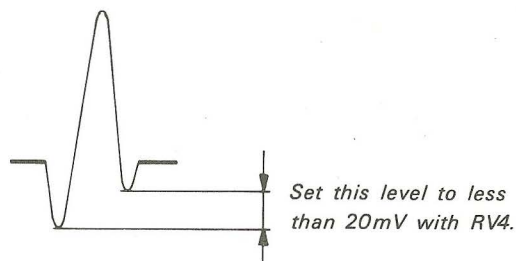
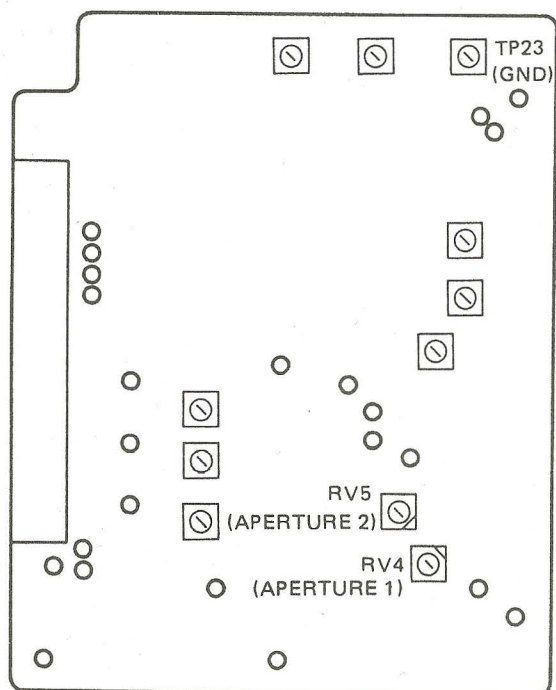
ADJUSTMENT OF BB BOARD APERTURE CIRCUIT AND ADDER INPUT LEVEL



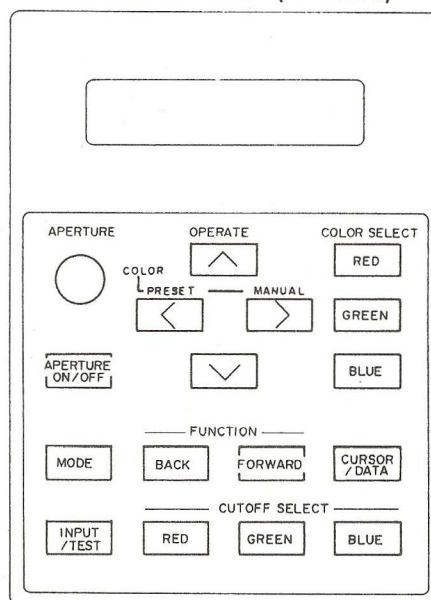
1. Input the SIN^2 signal.
2. Set the APERTURE SW on the control unit (N board) to ON.
3. Set the APERTURE VR to maximum.
4. Cut off all RED, GREEN and BLUE on the control unit (N board).
5. Connect YH (TP20) of the BB board to an oscilloscope.
6. Adjust with RV4 and RV5 of the BB board to make the level below 20mV as shown in Fig.



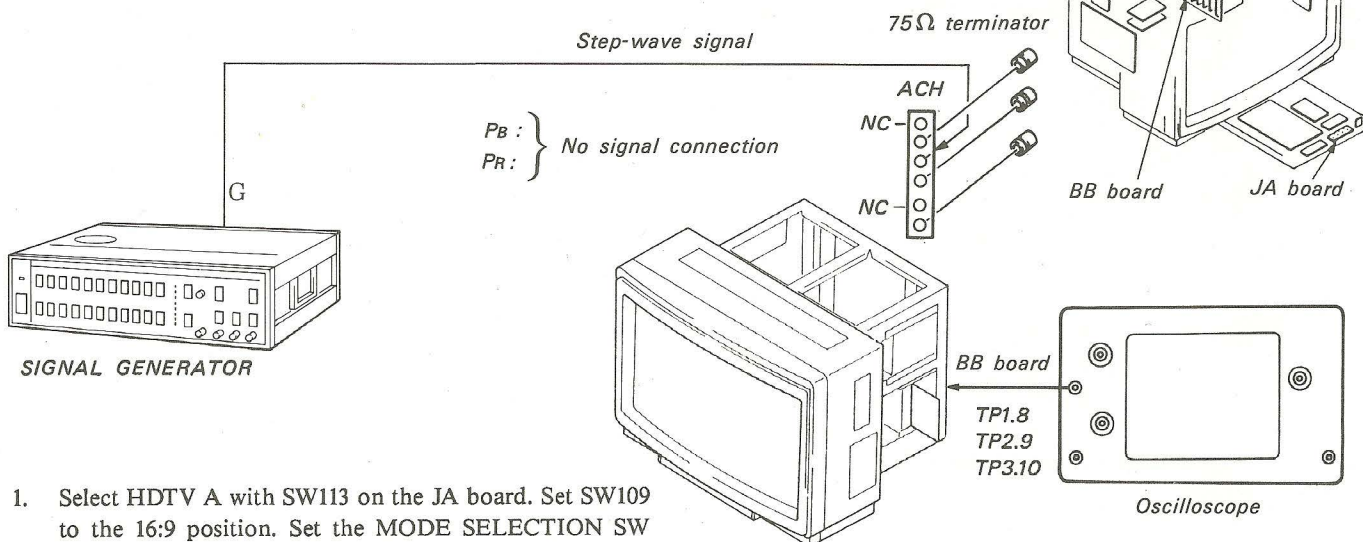
BB board



CONTROL UNIT (N board)



LEVEL ADJUSTMENT OF BB BOARD YCw CN MATRIX CIRCUIT



1. Select HDTV A with SW113 on the JA board. Set SW109 to the 16:9 position. Set the MODE SELECTION SW (COLOR/B&W) on the front panel to the COLOR position.

[LEVEL ADJUSTMENT OF RGB AND Y]

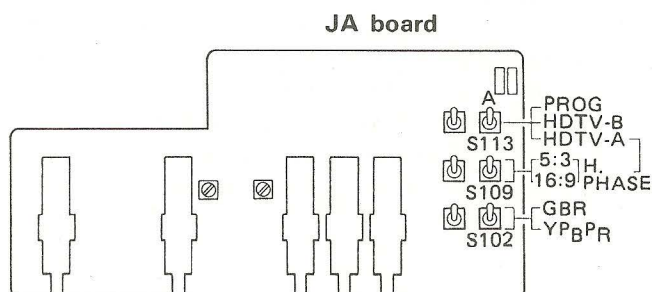
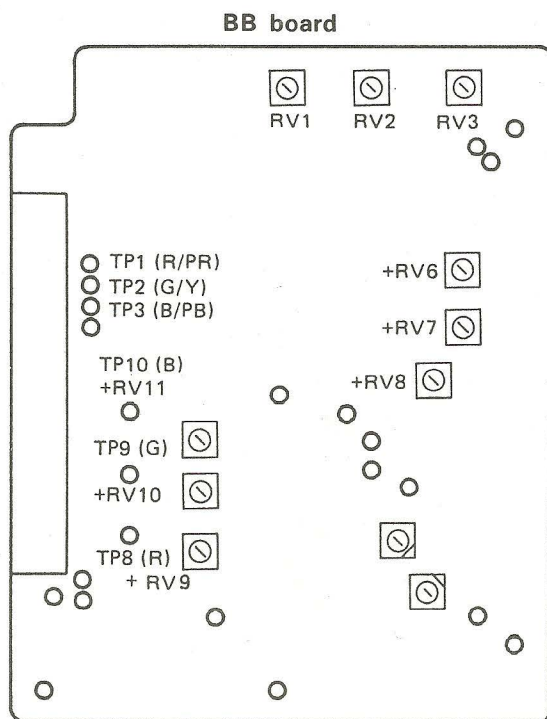
2. Remove J1 and J2 from the BB board.
3. Set SW102 on the JA board to the GBR position and measure the AMPLITUDE VR1 of R OUT (TP8) in the RGB mode.
4. Set SW102 on the JA board to the Y PB PR position and adjust RV1 so that amplitude of R OUT (TP8) in Y PB PR mode becomes $VR1 \pm 10 \text{ mVp-p}$.
5. Adjust G OUT and B OUT in the same manner as R OUT.
G OUT TP9, RV2
B OUT TP10, RV3
6. Change over SW102 on the JA board and confirm that the screen colors do not change in RGB mode and Y PB PR mode. If colors change, repeat all steps starting from step 3.
7. Insert back J1 and J2.

[LEVEL ADJUSTMENT OF RGB AND B&W]

8. Set SW102 on the JA board to the RGB position.
9. Set the MODE SELECTION SW (COLOR/B&W) on the front panel to the B&W position and measure amplitude VR2 of R OUT (TP8) in B&W mode.
10. Set MODE SELECTION SW (COLOR/B&W) on the front panel to COLOR position and adjust RV6 so that amplitude of R OUT (TP8) in the COLOR mode becomes $VR2 \pm 10 \text{ Vp-p}$.
11. Adjust G OUT and B OUT in the same manner as R OUT.
G OUT TP9, RV7
B OUT TP10, RV8
12. Change over the MODE SELECTION SW (COLOR/B&W) on the front panel and confirm that the colors on the screen are the same in both RGB mode and B&W mode.
If they have changed, repeat all steps starting from step 8.

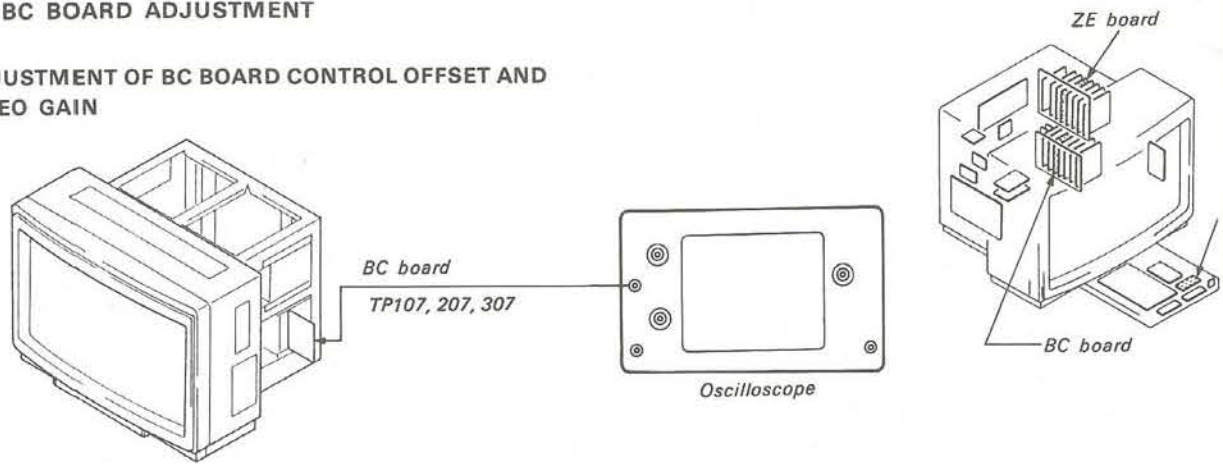
[LEVEL ADJUSTMENT OF RGB]

13. Set SW102 on the JA board to RGB, and the MODE SELECTION SW (COLOR/B&W) on the front panel to COLOR.
14. Measure amplitude VR3 of R IN (TP1).
15. Adjust RV9 so that amplitude of R OUT (TP8) becomes $VR3 \pm 10$ mVp-p.
16. Adjust G OUT and B OUT in the same manner.
 G TP2 (G IN), TP9 (G OUT), RV10
 B TP3 (B IN), TP10 (B OUT), RV11



4. BC BOARD ADJUSTMENT

ADJUSTMENT OF BC BOARD CONTROL OFFSET AND VIDEO GAIN

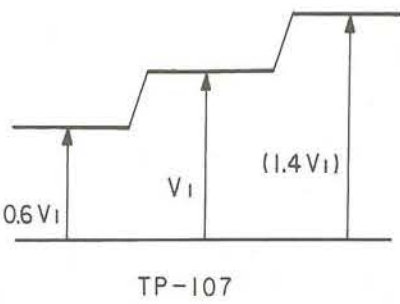


[DIGITAL UNIFORMITY CONTROL OFFSET ADJUSTMENT]

1. Receive the white signal (internal signal).
2. Set the position of SW1 on the ZE board to 1.
3. Set the BRIGHTNESS MANUAL SW on the front panel to ON, and turn the BRIGHTNESS control fully clockwise.
4. Set to ON the SW4 (DIGITAL UNIFORMITY ON/OFF) within the drawer on the W board.
5. Connect an oscilloscope to R-OUT (TP107) of the BC board and adjust R-OFFSET (RV102) so that the video amplitude becomes within ± 10 mV of the value when SW4 on the W board is set to OFF.

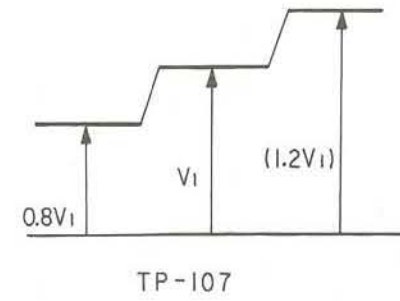
Note: Due to a difference of characteristics between IC103 and IC105, the clamp level may be slightly different when SW4 is selected. However, pay strict attention to the relative amplitude.

6. Connect an oscilloscope to G-OUT (TP207) on the BC board and adjust G-OFFSET (RV202) as in the above.
7. Connect an oscilloscope to B-OUT (TP307) on the BC board and adjust B-OFFSET (RV302) as in the above.
8. Set SW3 on the W board to ON/OFF and confirm that the luminance and the hue of the screen do not change. If they change excessively, perform again from step 4 above.



[BRIGHT LINKAGE RATIO ADJUSTMENT]

1. Receive the white signal (internal signal).
2. Turn the BRIGHTNESS control on the front panel fully counterclockwise.
3. Connect an oscilloscope to R-OUT (TP107) of the BC board and adjust BRT (RV1) so that the highest level becomes 1.2 times of the middle level.



4. Confirm that the above relationship of the gain exists also for G-OUT (TP207) and B-OUT (TP307) on the BC board.

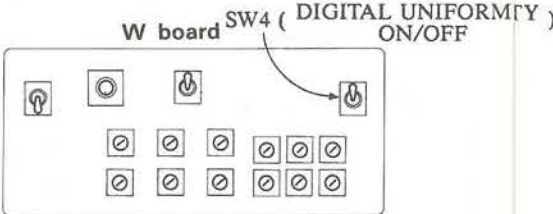
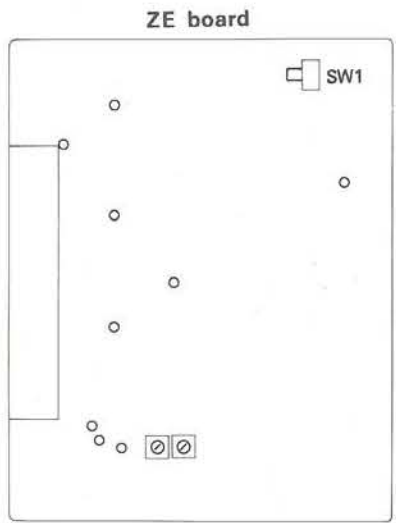
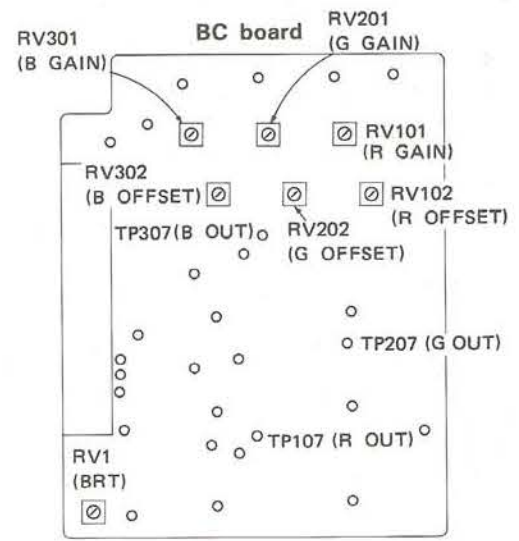
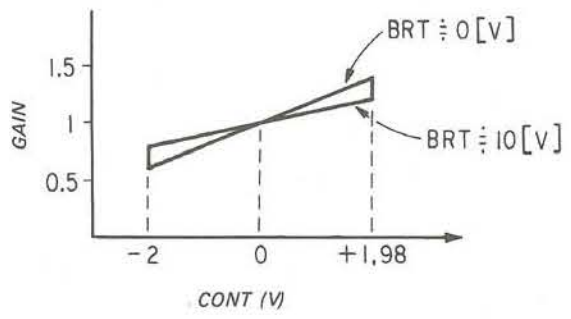
[GAIN ADJUSTMENT]

1. Receive the white signal (internal signal).
2. Set the position of SW1 of the ZE board to 2, and switch the adjustment signal.
3. Set SW4 on the W board to ON.
4. Connect an oscilloscope to R-OUT (TP107) on the BC board and adjust R-GAIN (RV201) so that the highest level becomes 1.4 times of the middle level.
5. Connect an oscilloscope to G-OUT (TP207) on the BC board and adjust the G-GAIN (RV201) so that the highest level becomes 1.4 times of the middle level.

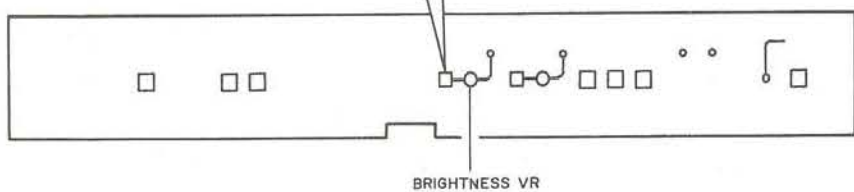
Note: Table shows the gain changes.

	TP1 BRT [V]	TP101 TP201 TP301 CONT [V]	GAIN of VIDEO	Modulation ratio (%)
Dark ↑ Bright	10	-2 0 +1.98	0.8 1 1.2	± 20
	5	-2 0 +1.98	0.7 1 1.3	± 30
	0	-2 0 +1.98	0.6 1 1.4	± 40

Gain change width by BRIGHT VR

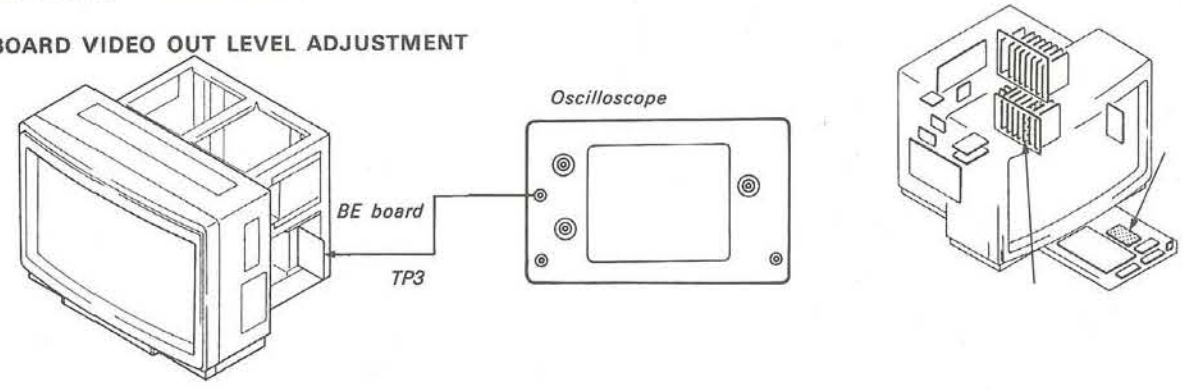


FRONT PANEL

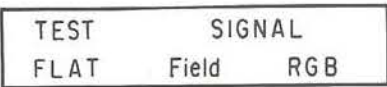


5. BE BOARD ADJUSTMENT

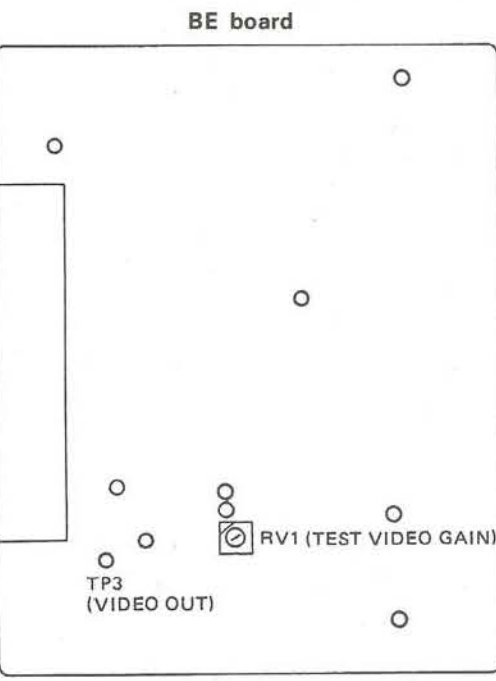
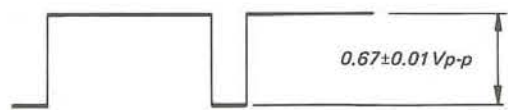
BE BOARD VIDEO OUT LEVEL ADJUSTMENT



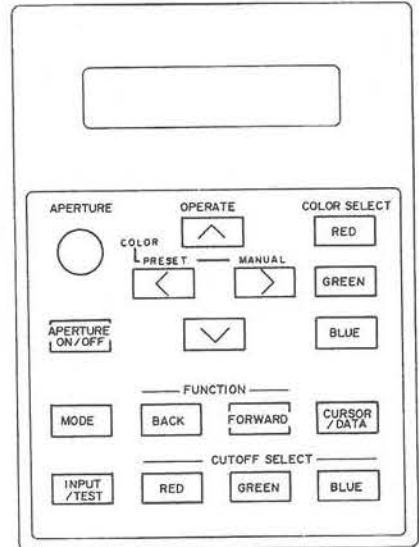
1. Press the INPUT/TEST key on the control unit (N board) and display the following.



2. Connect an oscilloscope to TP3 (VIDEO OUT) of the BE board and adjust RV1 (TEST VIDEO GAIN) so that the level becomes 0.67 ± 0.01 Vp-p.

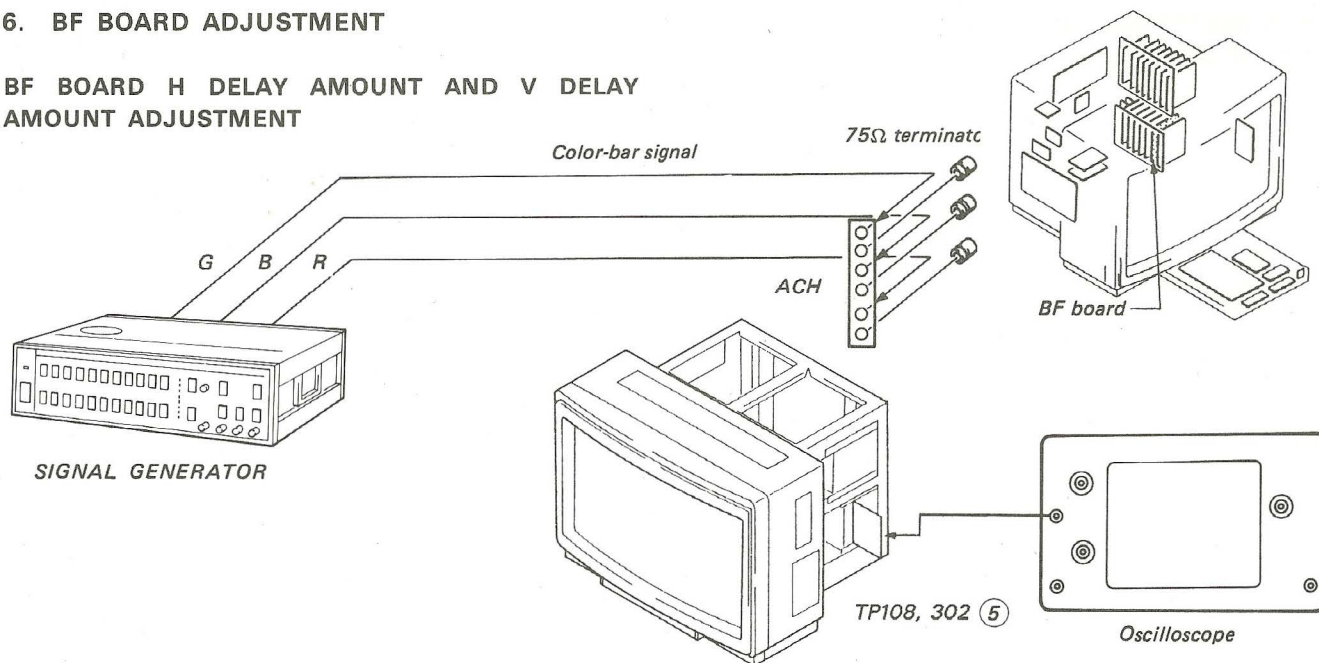


CONTROL UNIT (N board)



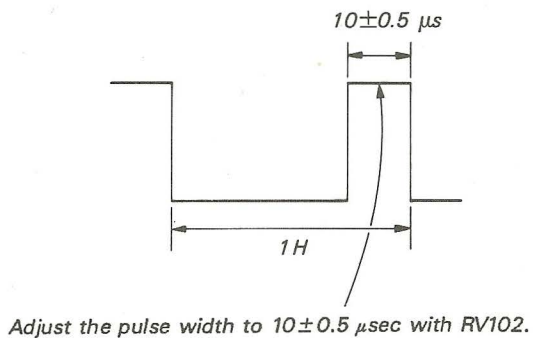
6. BF BOARD ADJUSTMENT

BF BOARD H DELAY AMOUNT AND V DELAY AMOUNT ADJUSTMENT

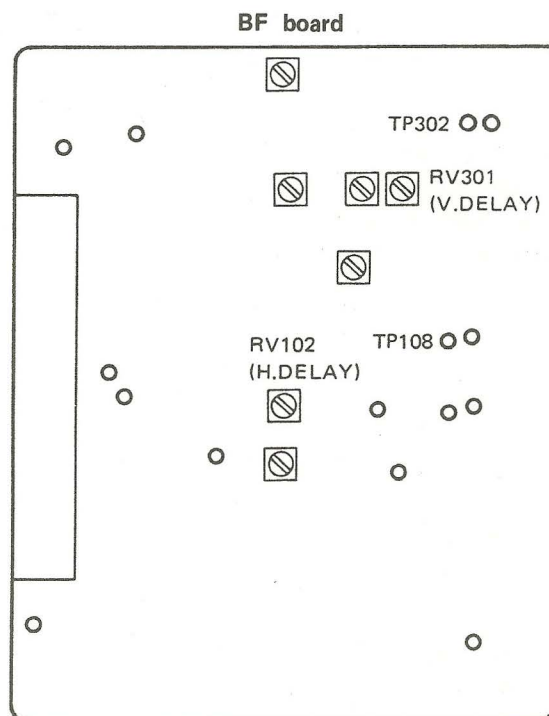
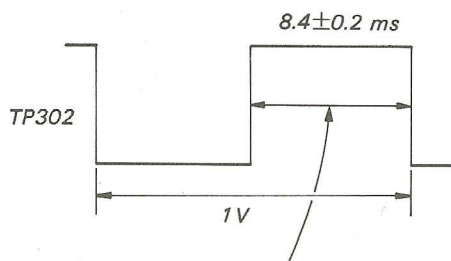


1. Input the color bar signal.
2. Monitoring TP108 on the BF board with an oscilloscope, turn ON the H DELAY SW and adjust the H DELAY (RV102) on the BF board so that the pulse width becomes $10 \pm 0.5 \mu\text{sec}$.
3. Monitoring TP302 on the BF board with an oscilloscope, turn ON the V DELAY SW and adjust the V DELAY (RV301) on the BF board so that the pulse width becomes $8.4 \pm 0.2 \text{ msec}$.

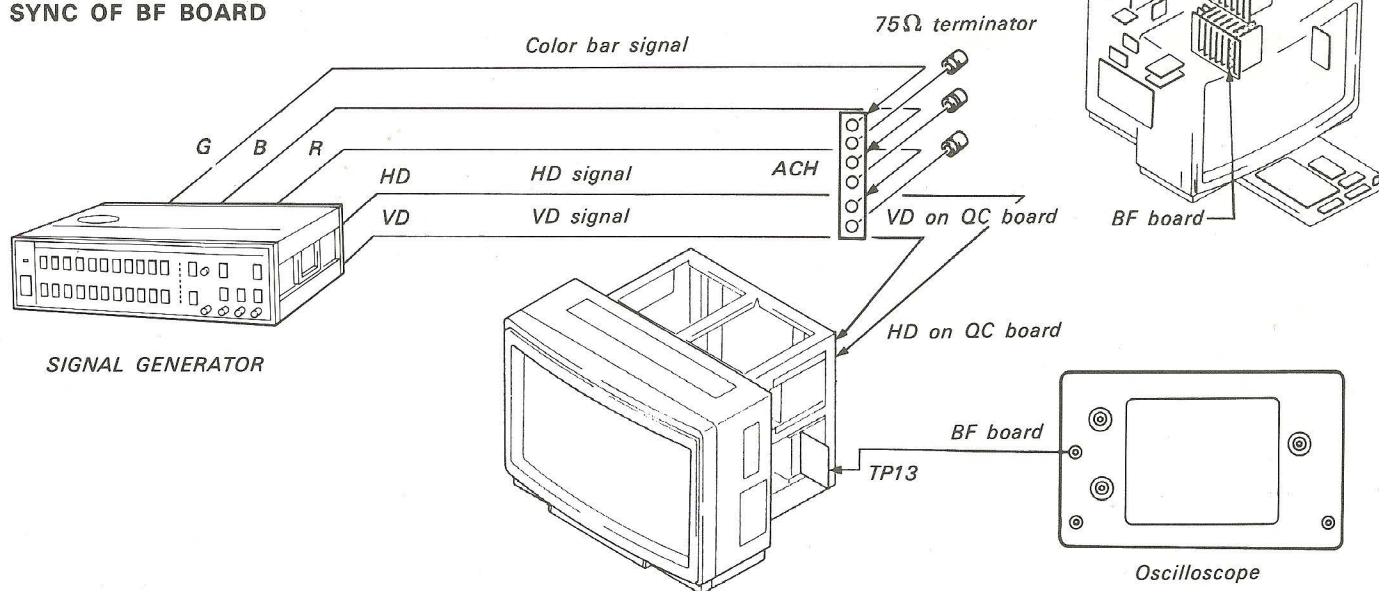
H Delay Amount Adjustment



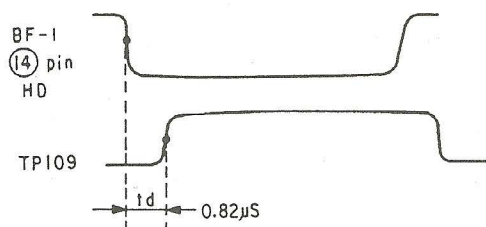
V Delay Amount Adjustment



PHASE MATCHING ADJUSTMENT OF HD AND H SYNC OF BF BOARD



1. Input the color bar signal.
2. Monitoring the pin ⑭ connector BF-1 and TP109 on the BF board with oscilloscope, adjust RV101 so that t_d shown in Fig. below becomes $0.82 \mu s$. t_d should be measured the point where amplitude is 50%.

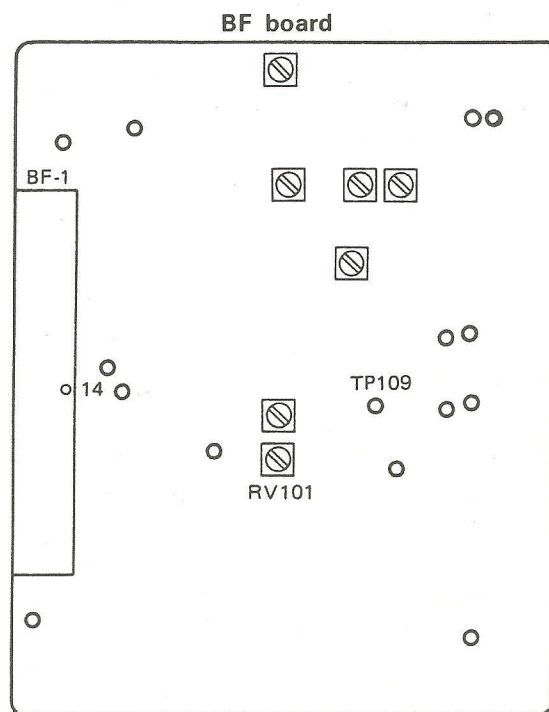
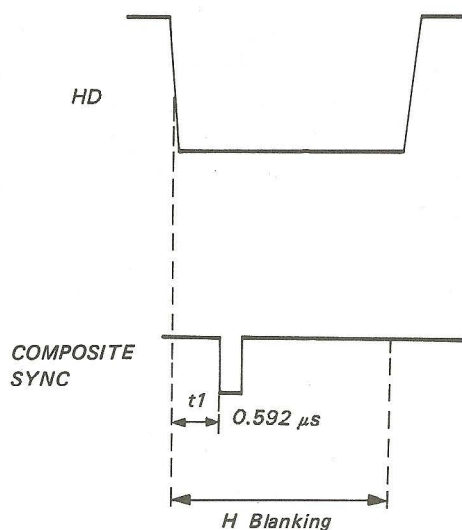


Adjust the pulse width of TP13 to $\Delta t = 0.30 \pm 0.01 \mu sec$ with RV3.

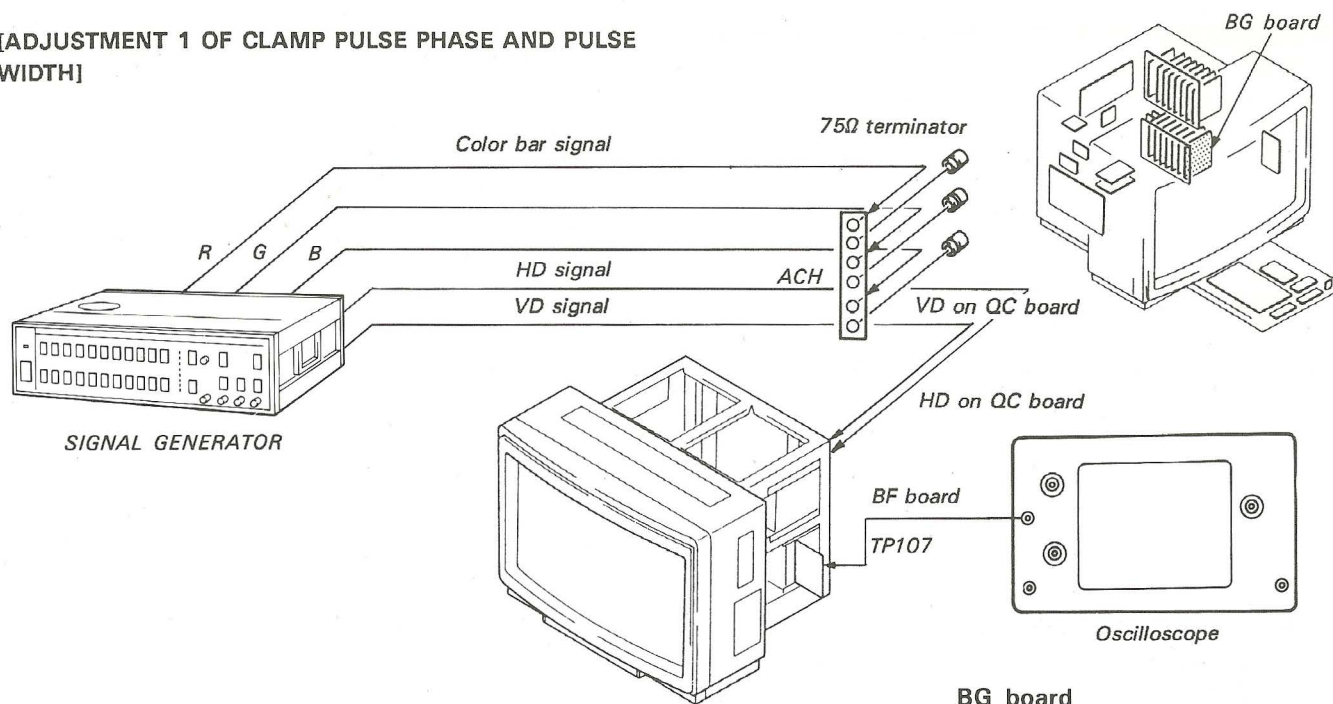
Measure Δt at 50% of the pulse level.

Note: At the time of shipment, input HD and H SYNC as shown in Fig. below and the phase is adjusted.

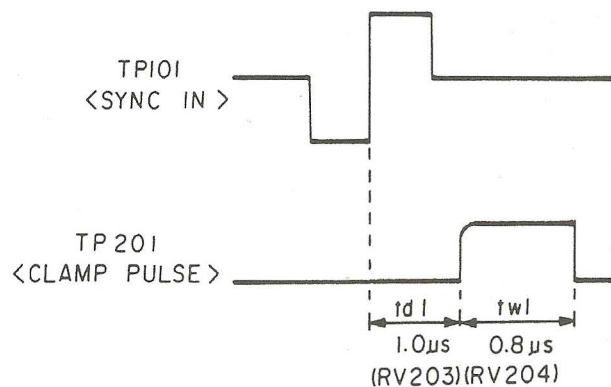
As shown in Fig. below, when different HD signal is input, re-adjust to obtain $t_d = t_1 + 0.23 (\mu s)$.



[ADJUSTMENT 1 OF CLAMP PULSE PHASE AND PULSE WIDTH]



1. Input the color bar signal.
2. Monitoring TP101 and TP201 on the BF board with an oscilloscope, adjust td_1 and tw_1 in Fig. below with RV203 and RV204. td_1 and tw_1 respectively should be the points where amplitude is 50%.

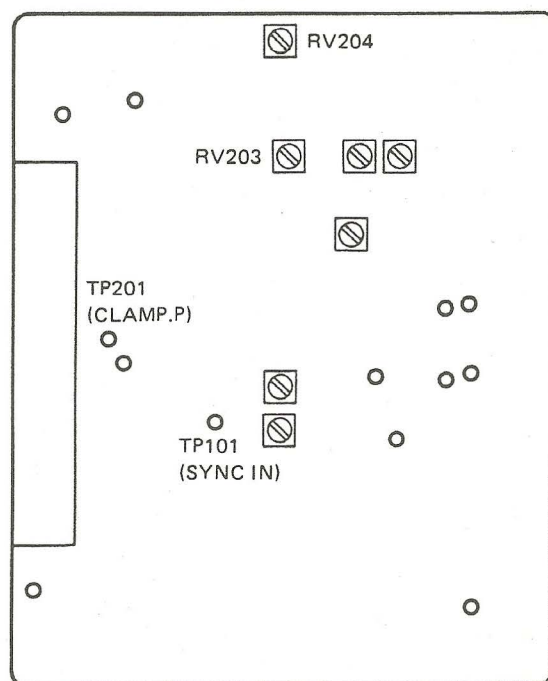


* td_1 and tw_1 shown above are the values when the BTA/SMPTE standard for HDTVs and the former HDTV standard (Sony standard or Tsukuba Exposition standard) are input.

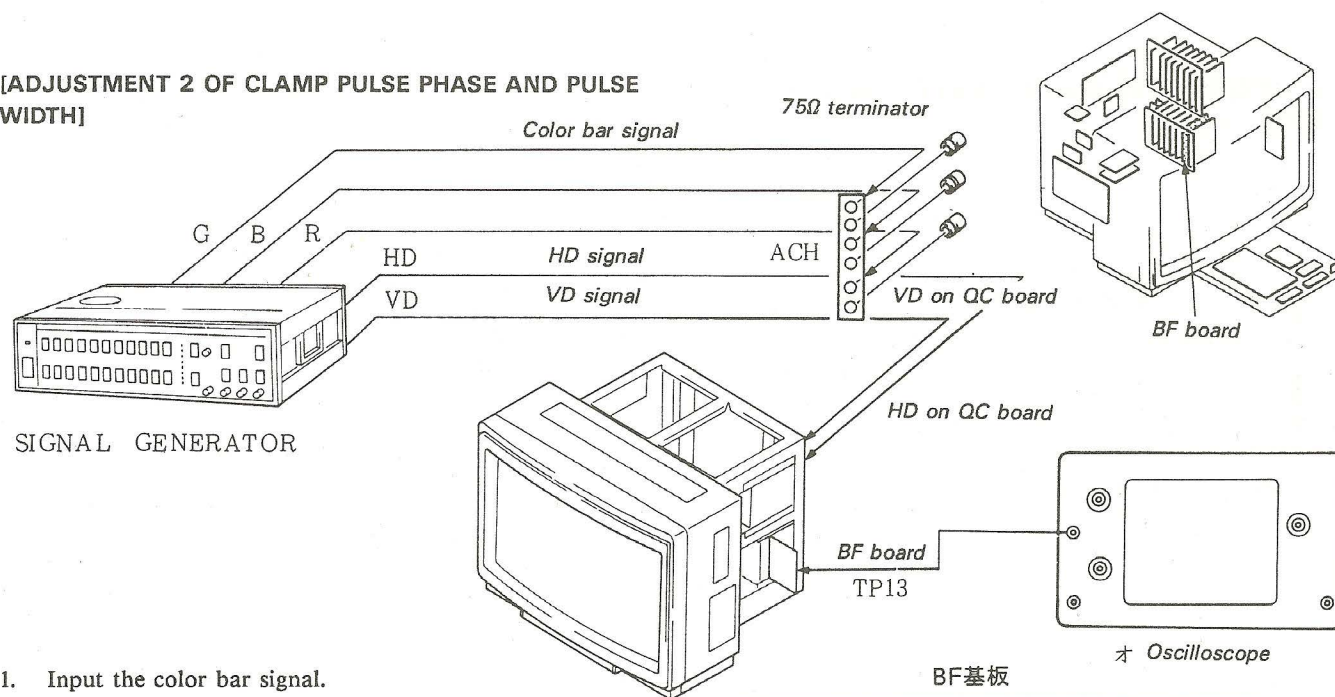
When a signal with a back porch of $1.8\mu s$ or less is input, re-adjust to obtain the following.

$td_1 + tw_1 < \text{BACK-porch period}$

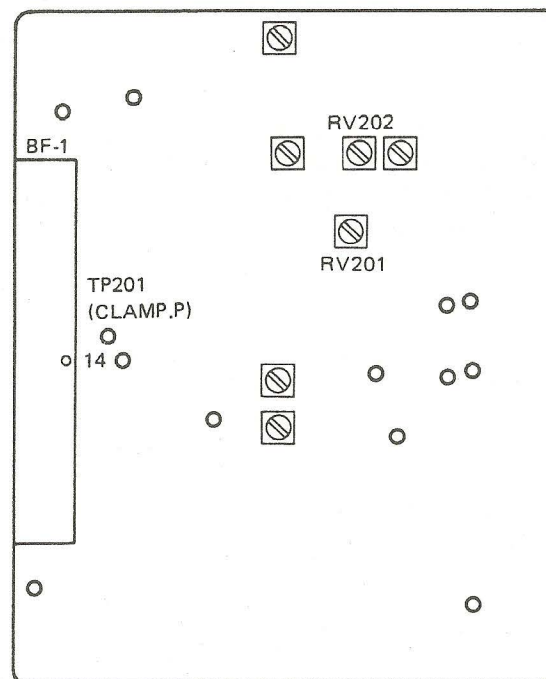
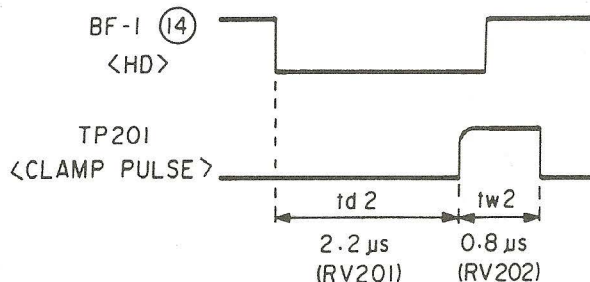
$tw_1 \geq 0.8\mu s$.



[ADJUSTMENT 2 OF CLAMP PULSE PHASE AND PULSE WIDTH]



1. Input the color bar signal.
2. Monitoring pin ⑭ connector BF-1 and TP201 on the BF board with an oscilloscope, adjust td_2 and tw_2 in the Fig. below with RV201 and RV202. td_2 and tw_2 should be measured the points where amplitude is 50%.

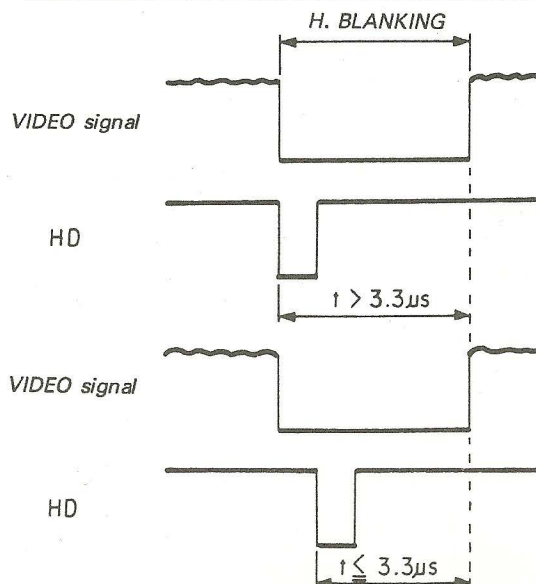


* As shown in Fig. 1, td_2 and tw_2 are values for the case of $t > 3.3 \mu s$.

As shown in Fig. 2, when the HD phase is delayed and $t \leq 3.3 \mu s$, the clamp pulse enters into the video signal period. When the HD signal like $t \leq 3.3 \mu s$ is input, adjust to obtain the following.

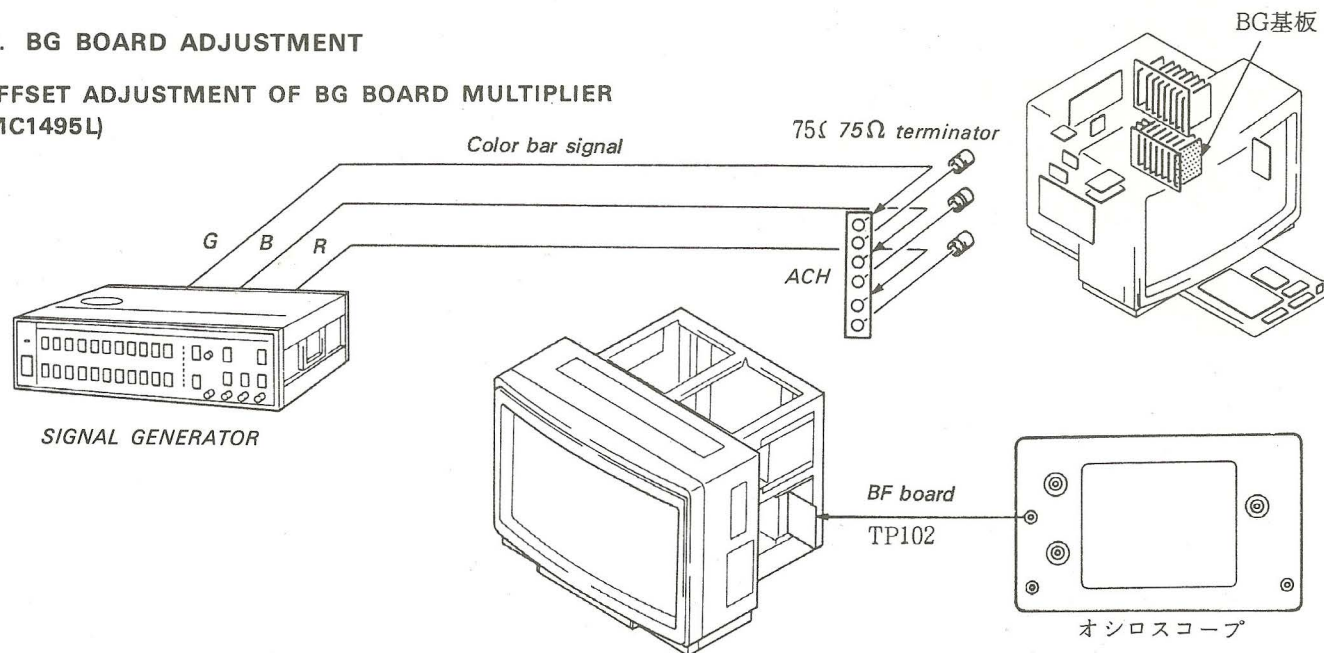
$$td_2 + tw_2 < t$$

$$tw_2 \geq 0.8 \mu s$$

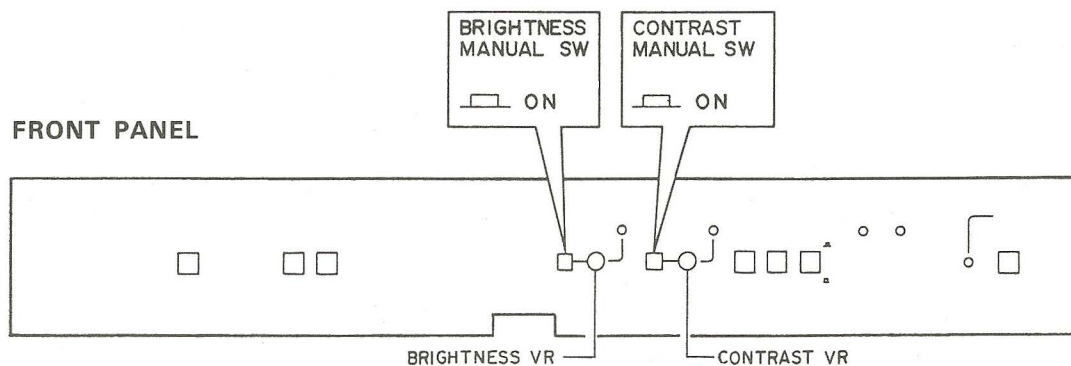


7. BG BOARD ADJUSTMENT

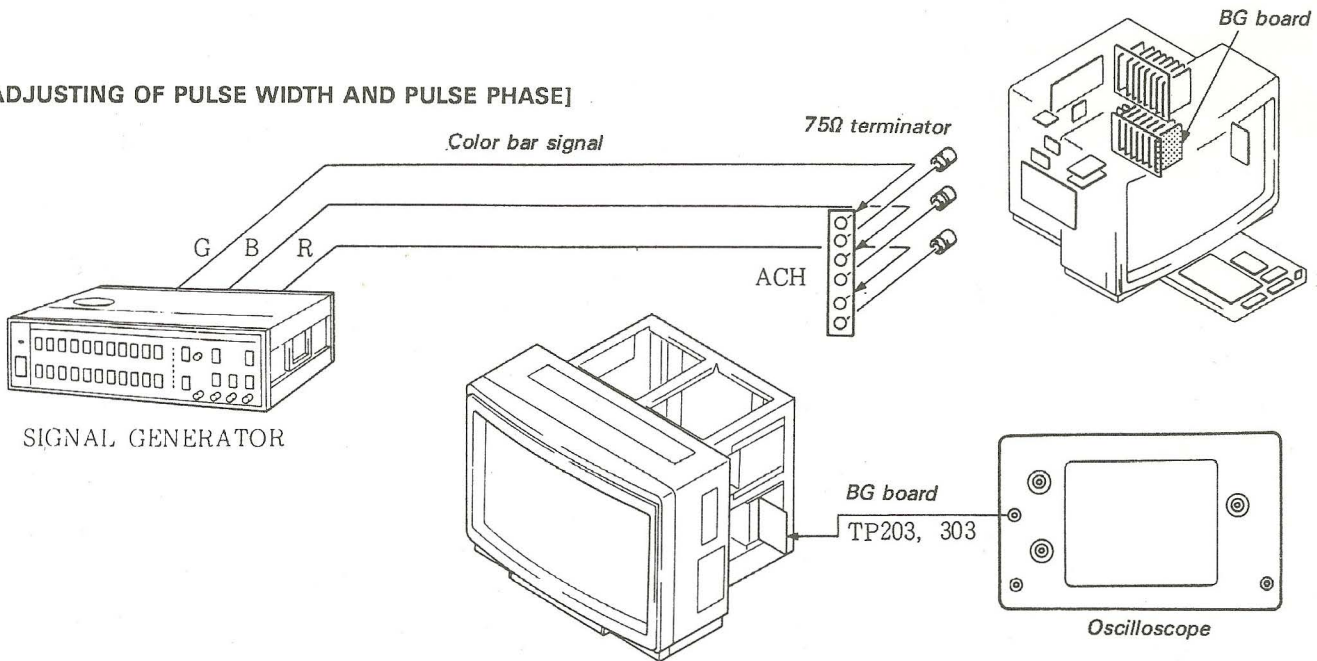
OFFSET ADJUSTMENT OF BG BOARD MULTIPLIER (MC1495L)



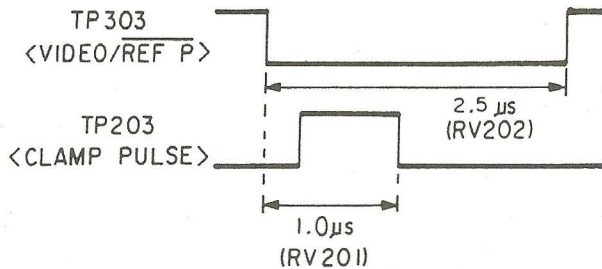
1. Input the dot signal, ignal.
2. Set the CONTRAST MANUAL SW to ON.
3. Set the BRIGHTNESS MANUAL SW to ON.
4. Connect TP106 on the BG board to GND.
5. Connect the oscilloscope probe to TP102 on the BG board.
6. Adjust OFFSET-2 (RV102) so that the DC level of TP102 does not change (amount of change within 20 mV) when the CONTRAST MANUAL control of the front panel is turned.
7. Remove TP106 on the BG board from GND and connect TP105 (CONTRAST) to GND.
8. Adjust OFFSET-1 (RV103) so that the DC level of TP102 does not change (amount of change within 20 mV) when the BRIGHTNESS MANUAL control of the front panel is turned.
9. While TP105 is connected to GND, adjust OFFSET-3 (RV101) so that the DC level of TP107 becomes 0V ($0V \pm 10$ mV).



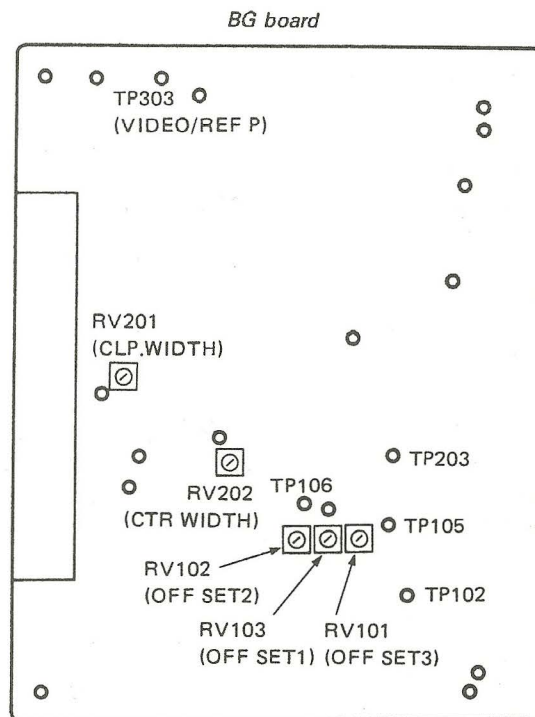
[ADJUSTING OF PULSE WIDTH AND PULSE PHASE]



1. Input the color bar signal.
2. As shown in the Fig. at right, adjust the phases of TP303 and TP203 with RV201.
3. Adjust the pulse width of TP303 with RV202.

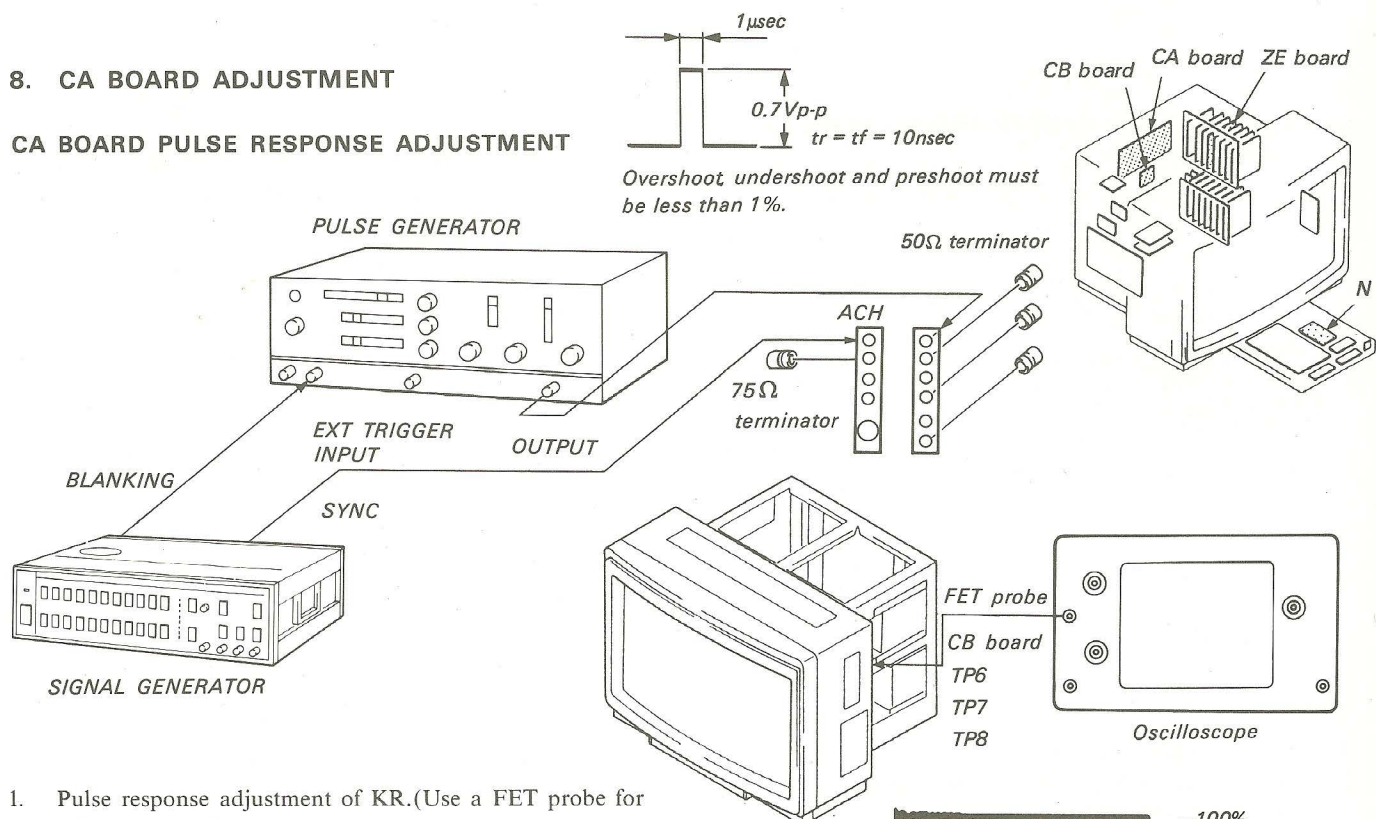


* Measurements should be performed at 50% of the pulse amplitude.

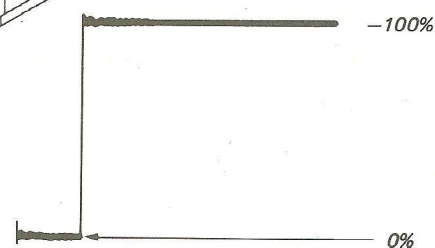


8. CA BOARD ADJUSTMENT

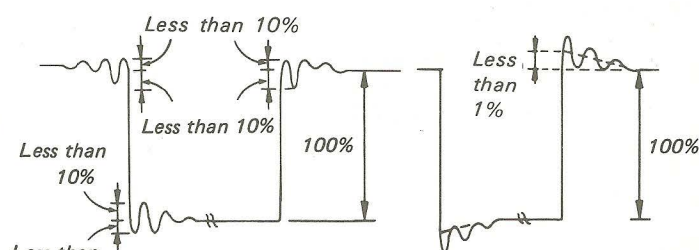
CA BOARD PULSE RESPONSE ADJUSTMENT



- Pulse response adjustment of KR. (Use a FET probe for adjustment of RV only.)
 - Set the position of SW1 on the ZE board to 1.
 - Set the SYNC SW of the front panel to EXT (□).
 - Input the pulse generator output to R channel.
 - Adjust the TP6 (KR) amplitude on the CB board to 40 Vp-p by turning the CONTRAST MANUAL control.
 - Adjust the overshoot, undershoot and preshoot within $\pm 10\%$ with R HIGH FREQUENCY (RV1).
 - Adjust the smear within $\pm 1\%$ with the R MIDDLE FREQUENCY (CV1).
- Adjust KG and KB in the same manner as the above.
 - Adjust KG with TP7, RV201 and CV201.
 - Adjust KB with TP8, RV401 and CV401.
- Set the **INPUT/TEST** key on the N board (Control unit) to the TEST side, and confirm that there is no smear in the GRAY SCALE.
- After the adjustment, set the position of SW1 on the ZE board to 0.
 - ※ As to the CA board and CB board, see page 4-49.
 - ※ The input signal should be 0.7Vp-p (during 50Ω termination), the pulse width 1μsec rising and lowering times 10 nsec and overshoot, undershoot and preshoot less than 1%.



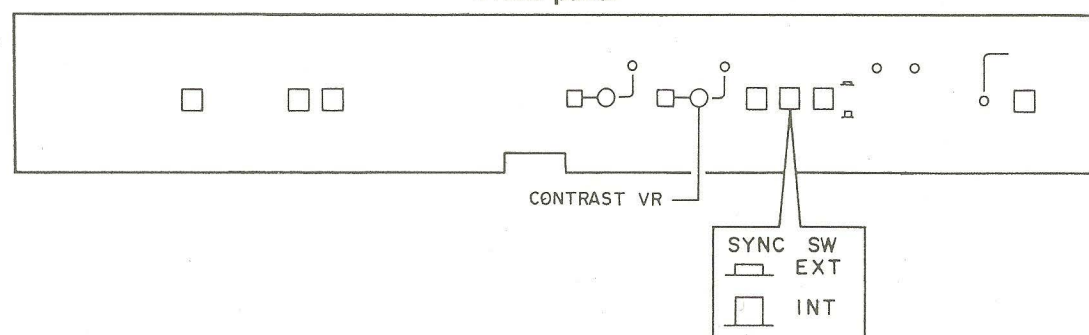
Waveform of TP6, TP7 and TP8



Adjustment of overshoot, undershoot and preshoot

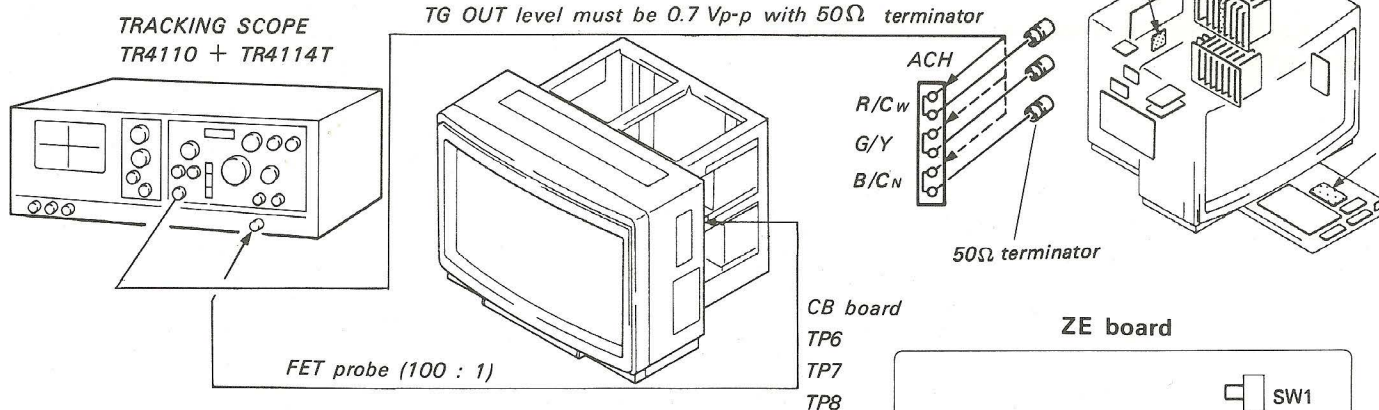
Adjustment of smear (Measure the mean value of the ringing.)

Front panel



oard

CA BOARD f CHARACTERISTICS CONFIRMATION



[f CHARACTERISTICS CONFIRMATION OF KR]

Set the position of SW1 on the ZE board to 1. (After the confirmation of this step, be sure to return it to 0.)

1. Input the tracking scope output to R channel.
2. Adjust the TP6 (KR) amplitude on the CB board to 50V p-p by turning the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within ± 1.5 dB in a range of 60 Hz to 30 MHz.

[f CHARACTERISTICS CONFIRMATION OF KG]

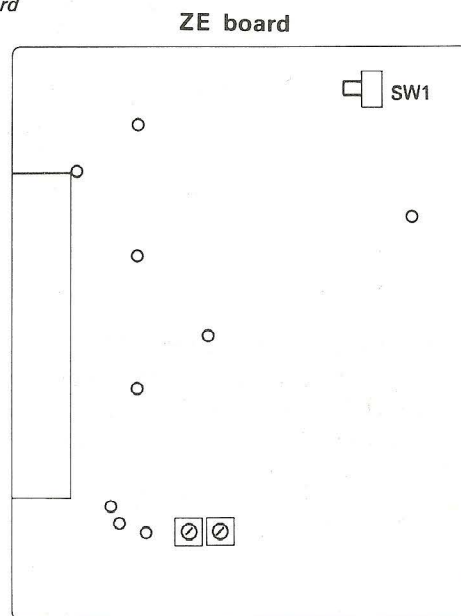
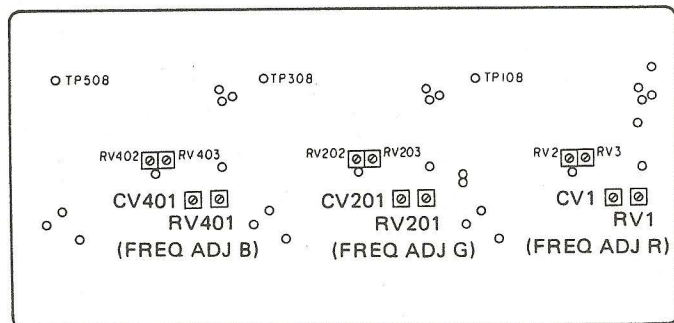
1. Input the tracking scope output to G channel.
2. Adjust the TP7 (KG) amplitude on the CB board to 50 Vp-p by turning the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within ± 1.5 dB in a range of 60 Hz to 30 MHz.

[f CHARACTERISTICS CONFIRMATION OF KB]

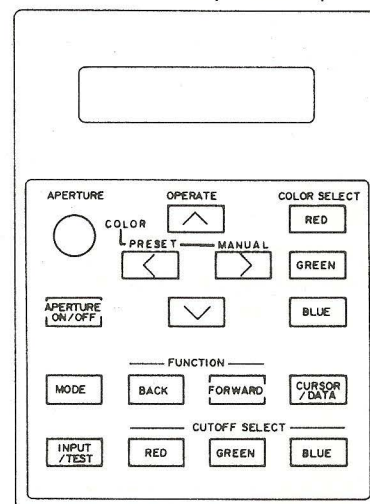
1. Input the tracking scope output to B channel.
2. Adjust the TP8 (KB) amplitude on the CB board to 50 Vp-p by turning the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within ± 1.5 dB in a range of 60 Hz to 30 MHz.
4. Set the **INPUT/TEST** key on the control unit (N board) to the TEST side and be sure that there is no smear in the GRAY SCALE.

Note: When the f characteristics is not within ± 1.5 dB, perform the adjustment in p.4-48 again and confirm the f characteristics.

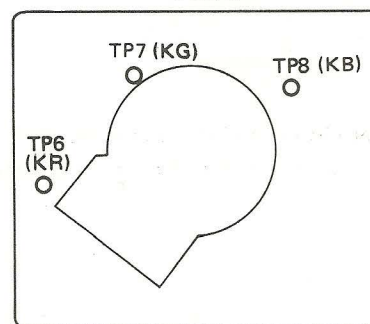
CA board



Control unit (N board)

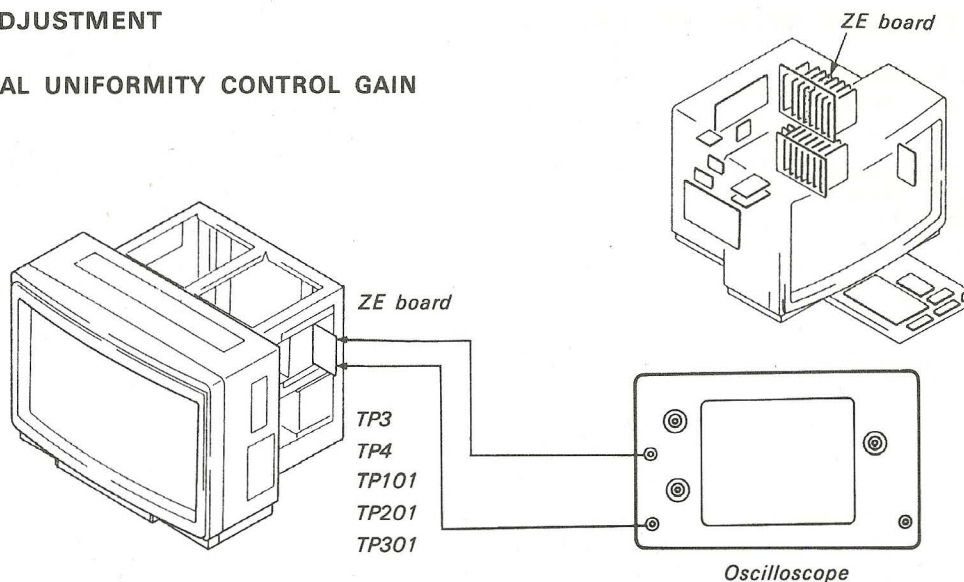


CB board

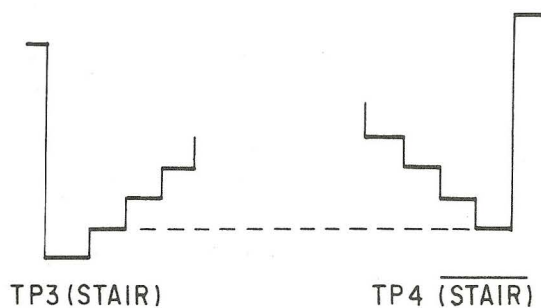


9. ZE BOARD ADJUSTMENT

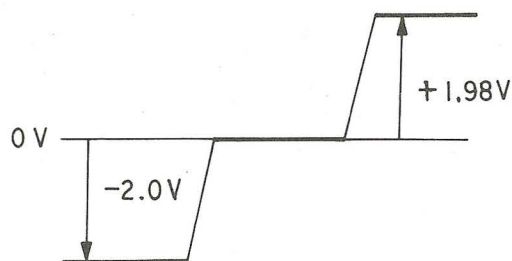
ZE BOARD DIGITAL UNIFORMITY CONTROL GAIN ADJUSTMENT



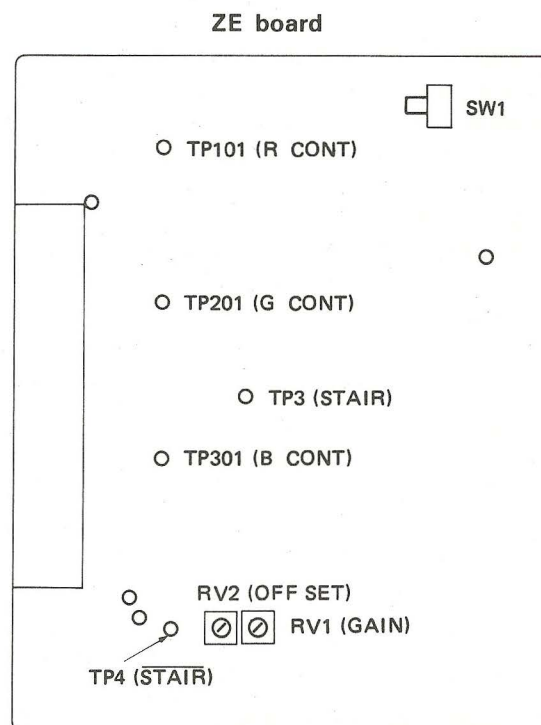
1. Connect an oscilloscope to STAIR (TP3) and $\overline{\text{STAIR}}$ (TP4) on the ZE board. Adjust OFFSET (RV2) on the ZE board so that the lowest level of $\overline{\text{STAIR}}$ (TP4) becomes the same with the 1st-stage level from the bottom of STAIR (TP3).



2. Set the position of SW1 to 2 and switch the control to the adjustment signal.
3. Connect an oscilloscope to R-CONT (TP101) on the ZE board, and adjust GAIN (RV1) so that the lowest level becomes -2.0V .



4. For G-CONT (TP201) and B-CONT (TP301) also on the ZE board, be sure the gain is the same as the above.



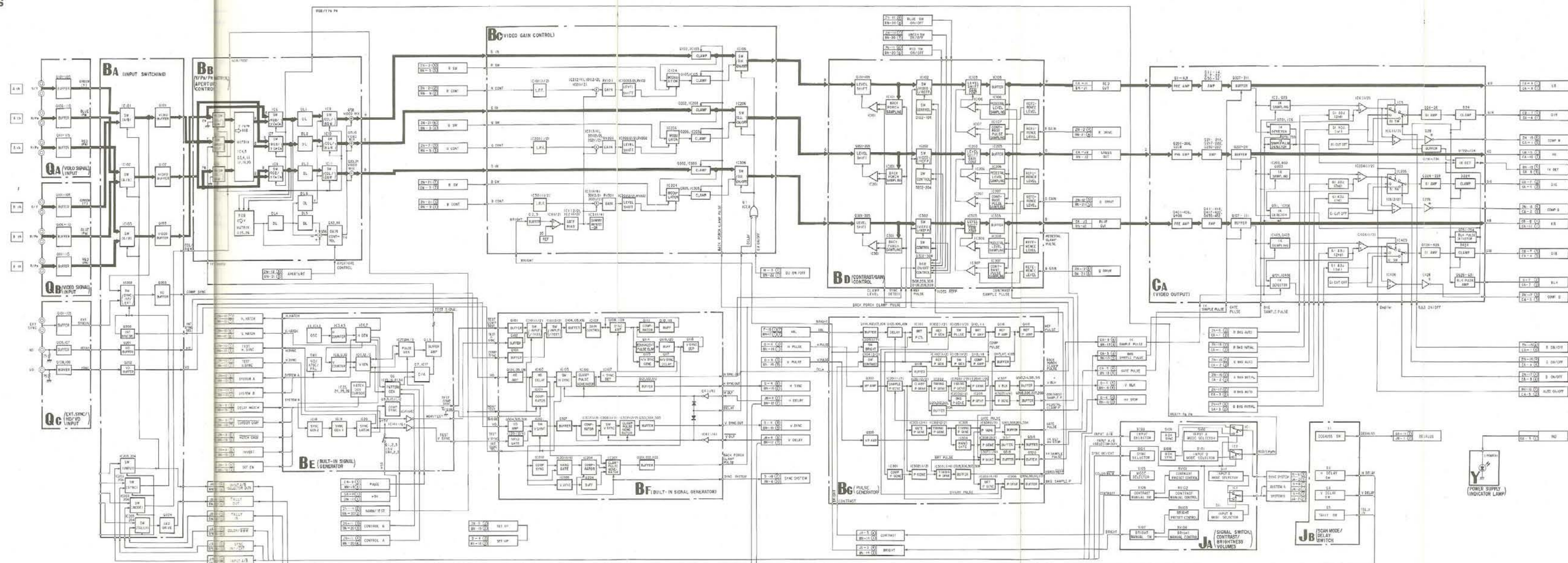
5-1. BLOCK DIAGRAM
SIGNAL PROCESSING BLOCK DIAGRAM

SECTION 5
DIAGRAMS

BLOCK DIAGRAMS BLOCK DIAGRAMS

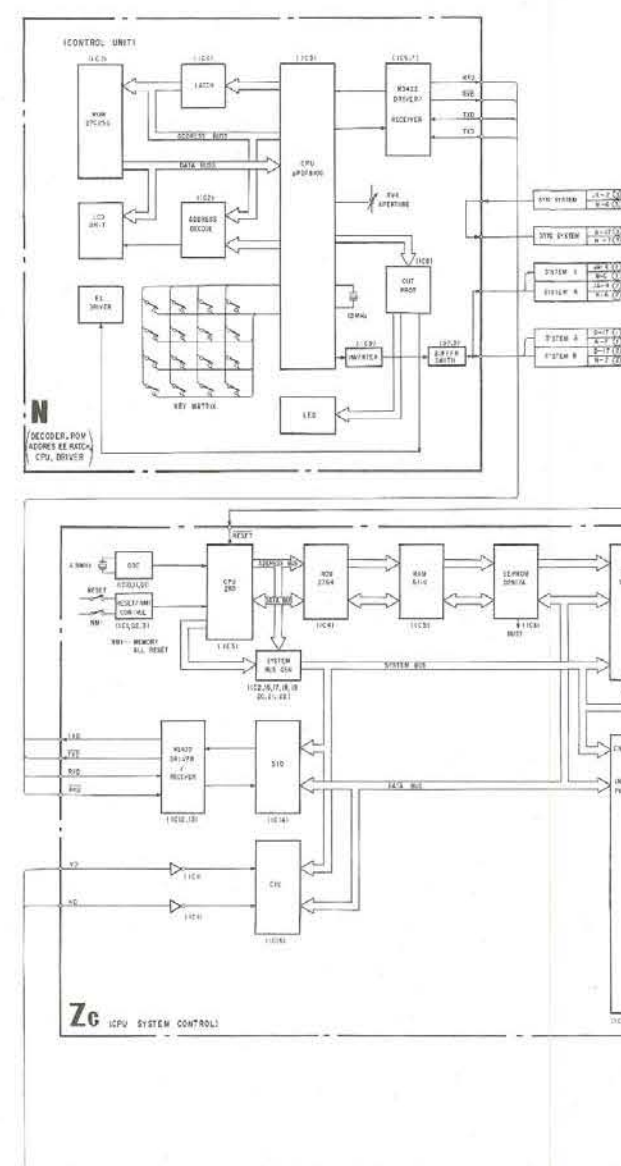
BLOCK DIAGRAMS BLOCK DIAGRAMS

BLOCK DIAGRAMS



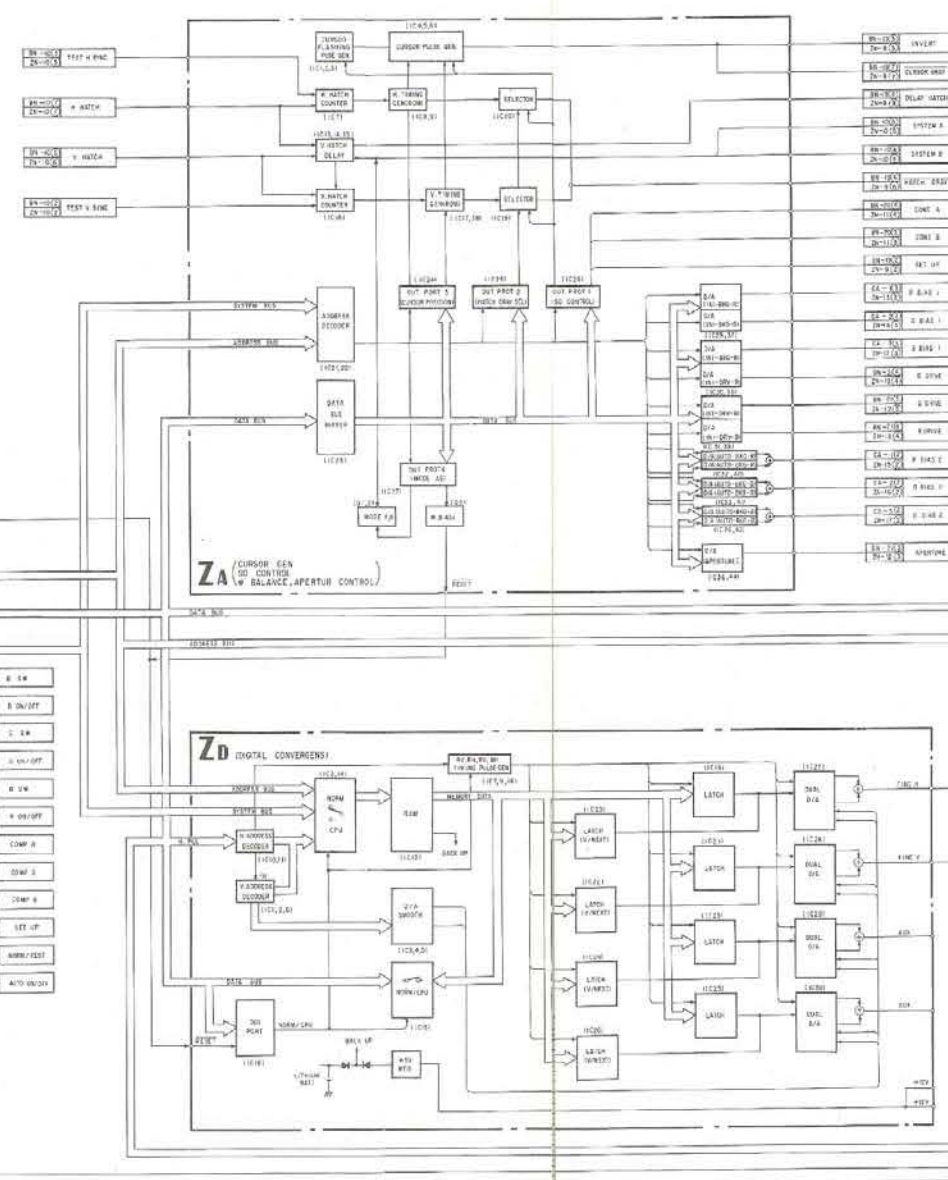
BLOCK DIAGRAMS

CONTROL PROCESSING BLOCK DIAGRAM



5-6

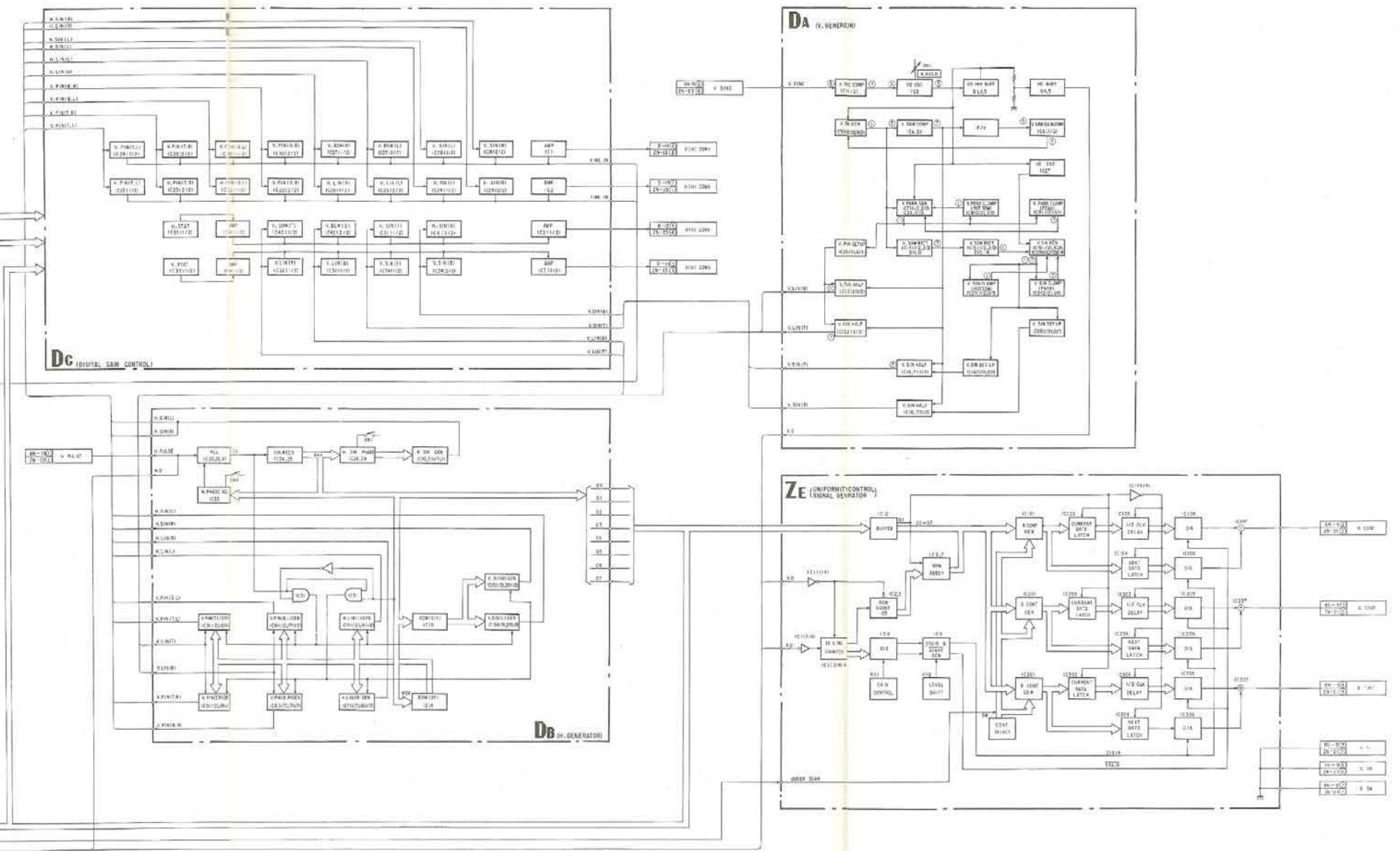
BLOCK DIAGRAMS BLOCK DIAGRAMS



5-7

5-8

BLOCK DIAGRAMS BLOCK DIAGRAMS



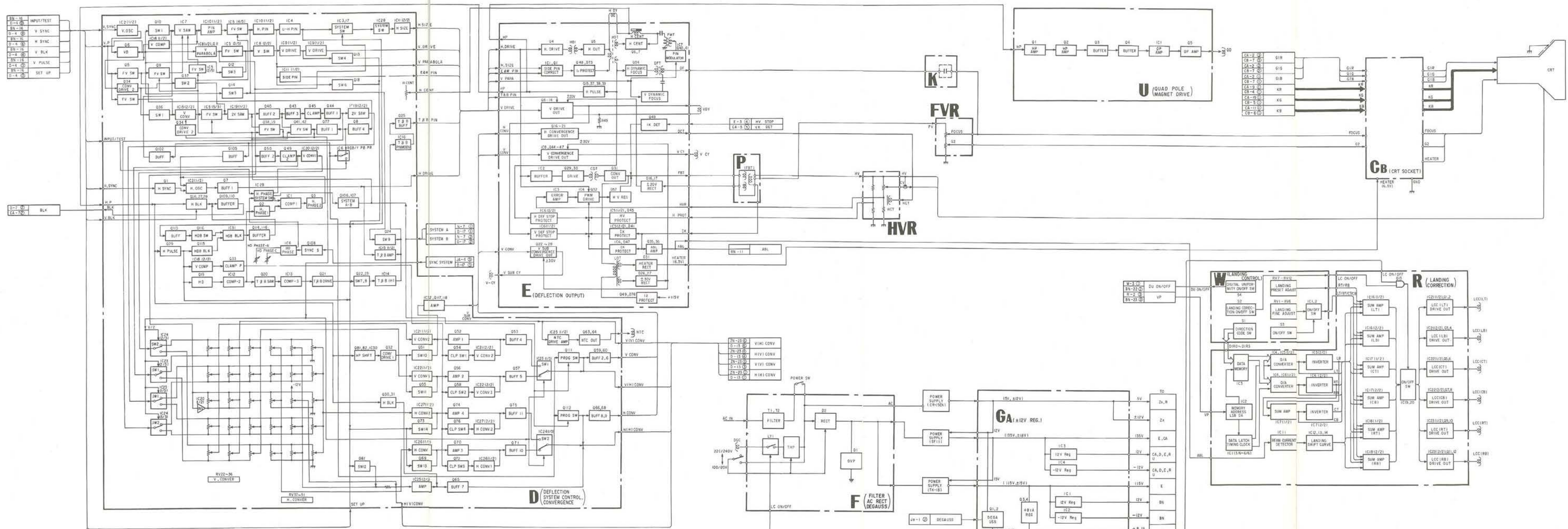
5-9

5-10

BLOCK DIAGRAMS

BLOCK DIAGRAMS

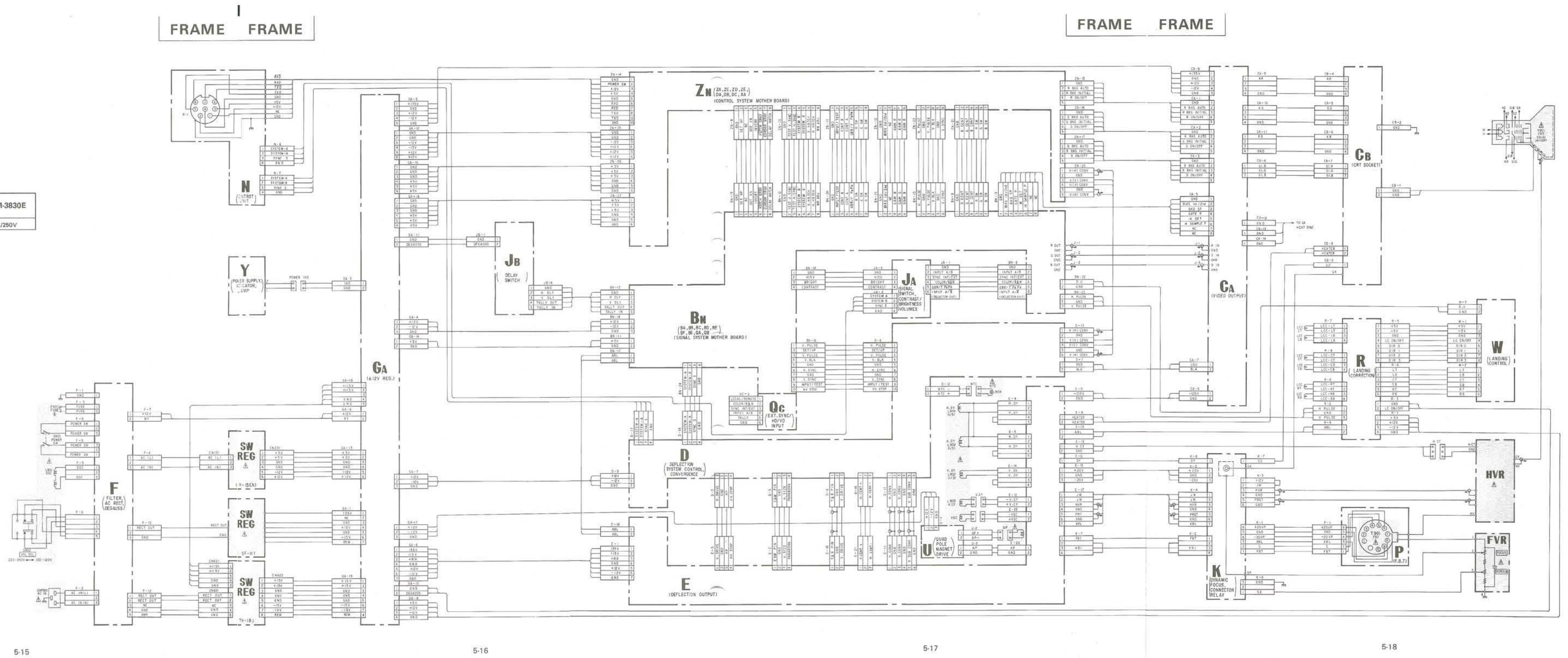
DEFLECTION PROCESSING BLOCK DIAGRAM



5-2. FRAME WIRING DIAGRAM


* NOTE


Ref	Model	HDM-3830	HDM-3830E
F901 (FUSE)		6.3A/125V	4A/250V
















5-3. MOUNTING AND SCHEMATIC DIAGRAMS



— Conductor Side —

Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et par une marque  sont d'une importance critique pour la sécurité. Ne les remplacer que par des pièces de numéro spécifié.


Note:

- All capacitors are in μF unless otherwise noted. P : μF 50WV or less are not indicated except for electrolytics.
- All resistor are in ohms, 1/6W on the BC, BD, DA, DB, DC, QA, QB, R, W, ZA, ZD and ZE board and 1/4W on the rest of the boards unless otherwise specified.
-  : nonflamable resistor.
-  : fusible resistor.
-  : internal component.
-  : panel designation.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- The components identified by  in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.
- When replacing components identified by  mark the necessary adjustments indicated. If results do not meet the specified value, change the component identified by  and repeat the adjustment until the specified value is achieved. (Refer to  D40,  R114,  R115,  R140,  R141,  R183 adjustment on page 4-19~4-22.) When replacing the part in below table, be sure to perform the related adjustment.

Part replaced ()	Adjustment ()
D40, R114, R115, R116, R184, RV2 (E board)	D40, R114, R115 (Page 4-19)
D39, R140, R141, R144, R183 (E board)	R140, R141, R183 (Page 4-19)





- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a 10M Ω digital multimeter.
- Readings are taken with a color-bar signal input.

BE board

(): INPUT/TEST selector (N board S14) ... TEST
MODE switch (N board S10) ... INTERNAL
TEST SIGNAL
FUNCTION switch (N board S11, S12) ...
HATCH



BB board

<  >: INPUT A mode selector (JA board S102) ...
Y PB PR

-  : Can not be measured.
-  : B + bus.
-  : B - bus.
- Voltage variations may be noted due to normal production tolerances.
-  : adjustment for repair.

- Switches and controls are set as follows unless otherwise noted

FRONT PANEL

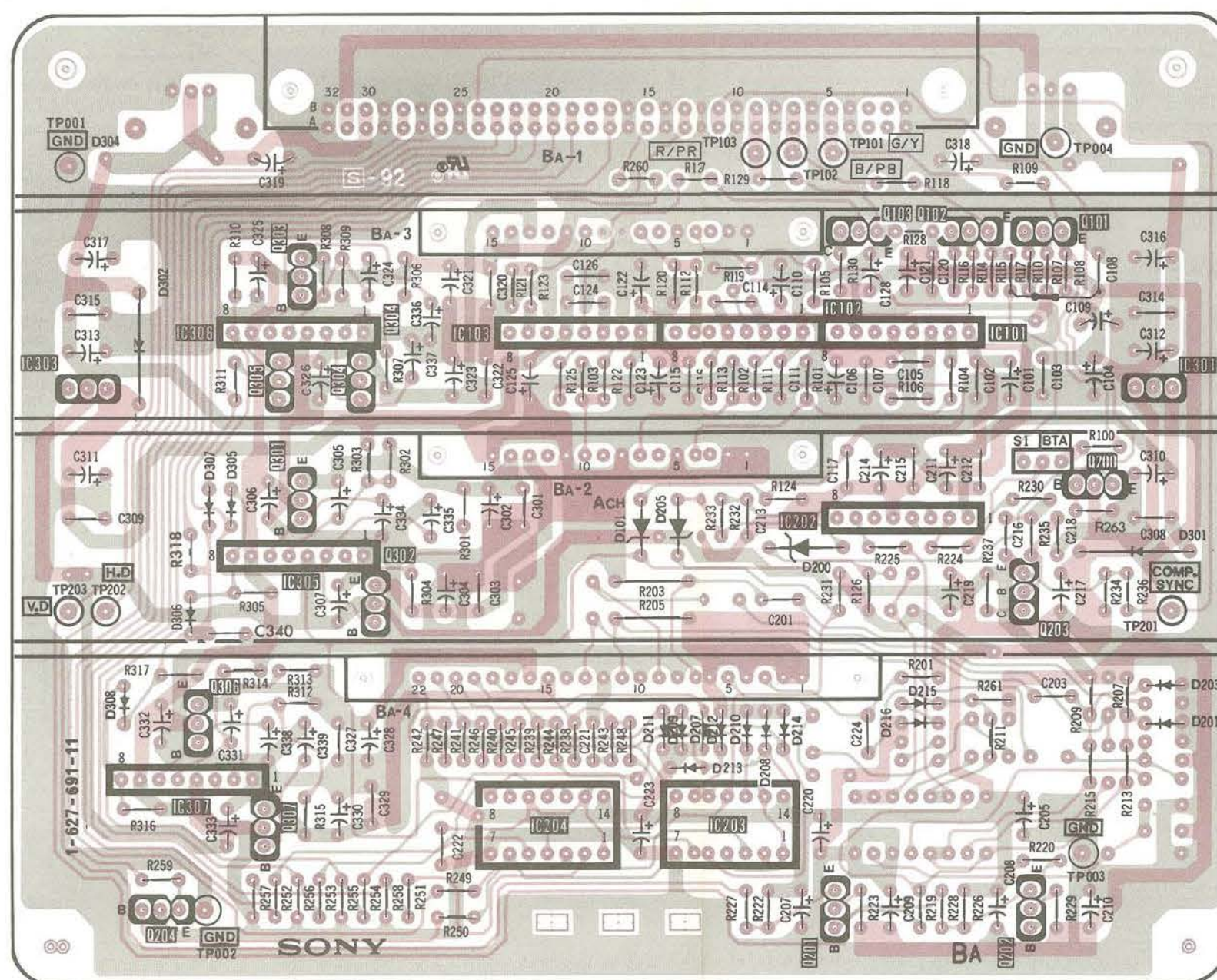
1. INPUT switch A (□) —————
2. SYNC switch INT (□) —————
3. MODE switch COLOR (□) ————— JA board
4. CONTRAST MANUAL switch PRESET (□) —————
5. BRIGHTNESS MANUAL switch PRESET (□) —————
6.  SCAN MODE V DELAY switch OFF (□) ————— JB board
7.  SCAN MODE H DELAY switch OFF (□) —————

SUB CONTROL PANEL

8. Control unit Initial condition N board
With the internal signal (at the power on time): TEST MODE
9. LANDING ADJ ON/OFF switch (SW2) ON —————
10. LANDING ADJ DIRECTION switch (SW1) Match to monitor setting direction. ————— W board
11. LANDING FINE ADJ ON/OFF switch (SW3) OFF
12. DIGITAL UNIFORMITY ON/OFF switch (SW4) ... ON —————
13. INPUT A MODE SELECT switch (SW102) GBR —————
14. INPUT B MODE SELECT switch (SW101) GBR —————
15. INPUT A H PHASE SELECT switch (SW109) 16:9
16. INPUT B H PHASE SELECT switch (SW108) 16:9
17. INPUT A SYSTEM SELECT switch (SW113) HDTV A ————— JA board
18. INPUT B SYSTEM SELECT switch (SW110) HDTV A —————

BA board (INPUT SWITCHING)

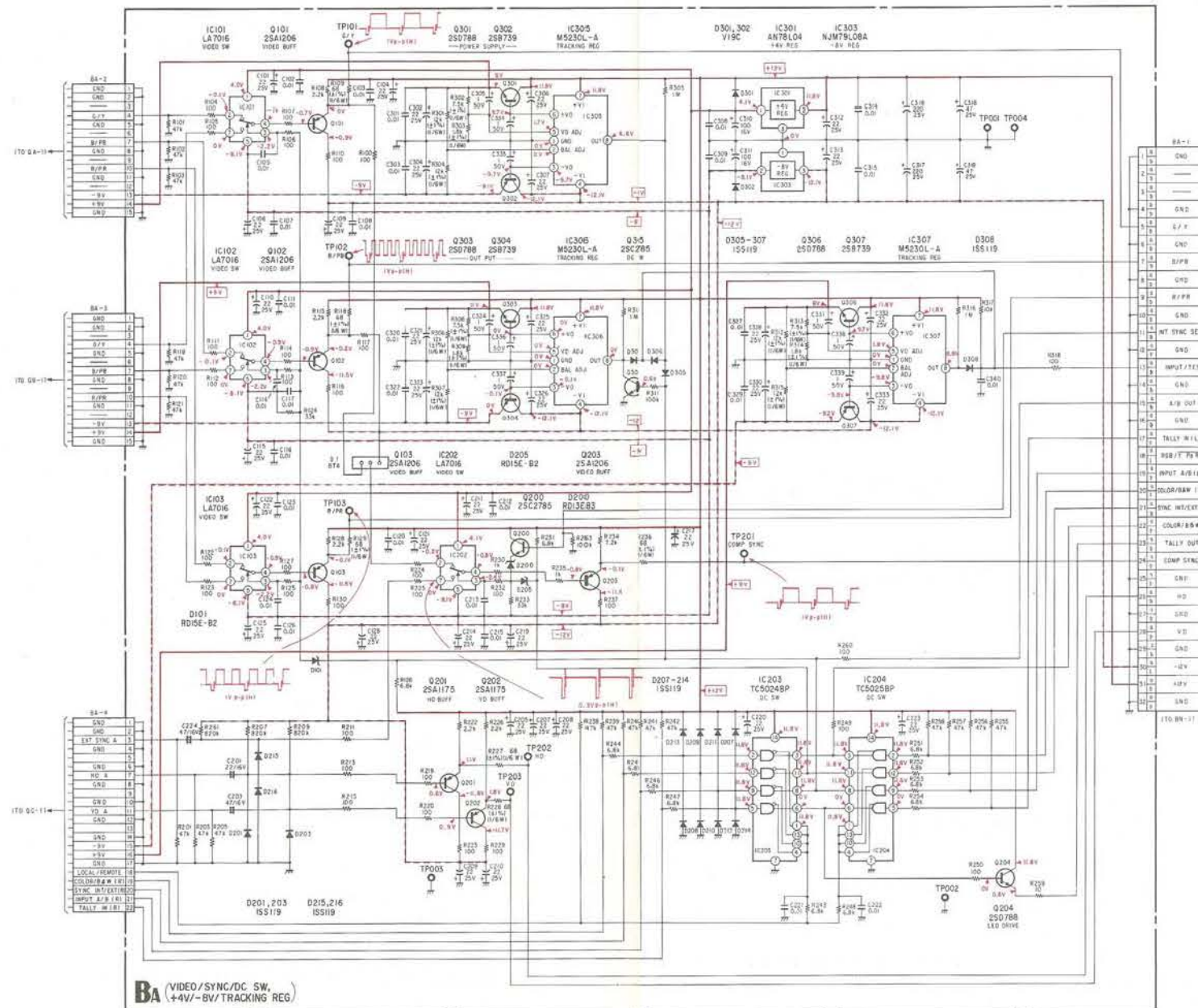
IC	303 307	306 305	103 204	102 203	101 202	301
Q	306 204	303 305 301	304 302	201	103 102 101 203 202	200
D	302 308	307,305 306	101, 205 209 211	200 210 214 213 212 208	215 216	203 301, 201
TP	TP203,202			TP103,102,101		TP201



- : Conductor side pattern
- : Component side pattern

BA BA

BA board (INPUT SWITCHING)



BA

BA board

IC101	LA7016	VIDEO SW
102	LA7016	VIDEO SW
103	LA7016	VIDEO SW
202	LA7016	VIDEO SW
203	TC5024BP	DC SW
204	TC5025BP	DC SW
301	AN78L04	+4V REG
303	NJM79L08A	-8V REG
305	MS230L-A	TRACKING REG
306	MS230L-A	TRACKING REG
307	MS230L-A	TRACKING REG
Q101	2SA1206	VIDEO BUFF
102	2SA1206	VIDEO BUFF
103	2SA1206	VIDEO BUFF
Q200	2SC2785	
201	2SA1175	HD BUFF
202	2SA1175	VD BUFF
203	2SA1206	VIDEO BUFF
204	2SB788	LED DRIVE
301	2SB788	POWER SUPPLY
302	2SB739	POWER SUPPLY
303	2SB788	OUTPUT
304	2SB739	OUTPUT
305	2SC2785	DC SW
306	2SB788	
307	2SB739	
D101	RD15EB2	
D200	RD13EB3	
201	1SS119	
203	1SS119	
205	RD15EB2	
207	1SS119	
208	1SS119	
209	1SS119	
210	1SS119	
211	1SS119	
212	1SS119	
213	1SS119	
214	1SS119	
215	1SS119	
216	1SS119	
301	V19C	
302	V19C	
305	1SS119	
306	1SS119	
307	1SS119	
308	1SS119	

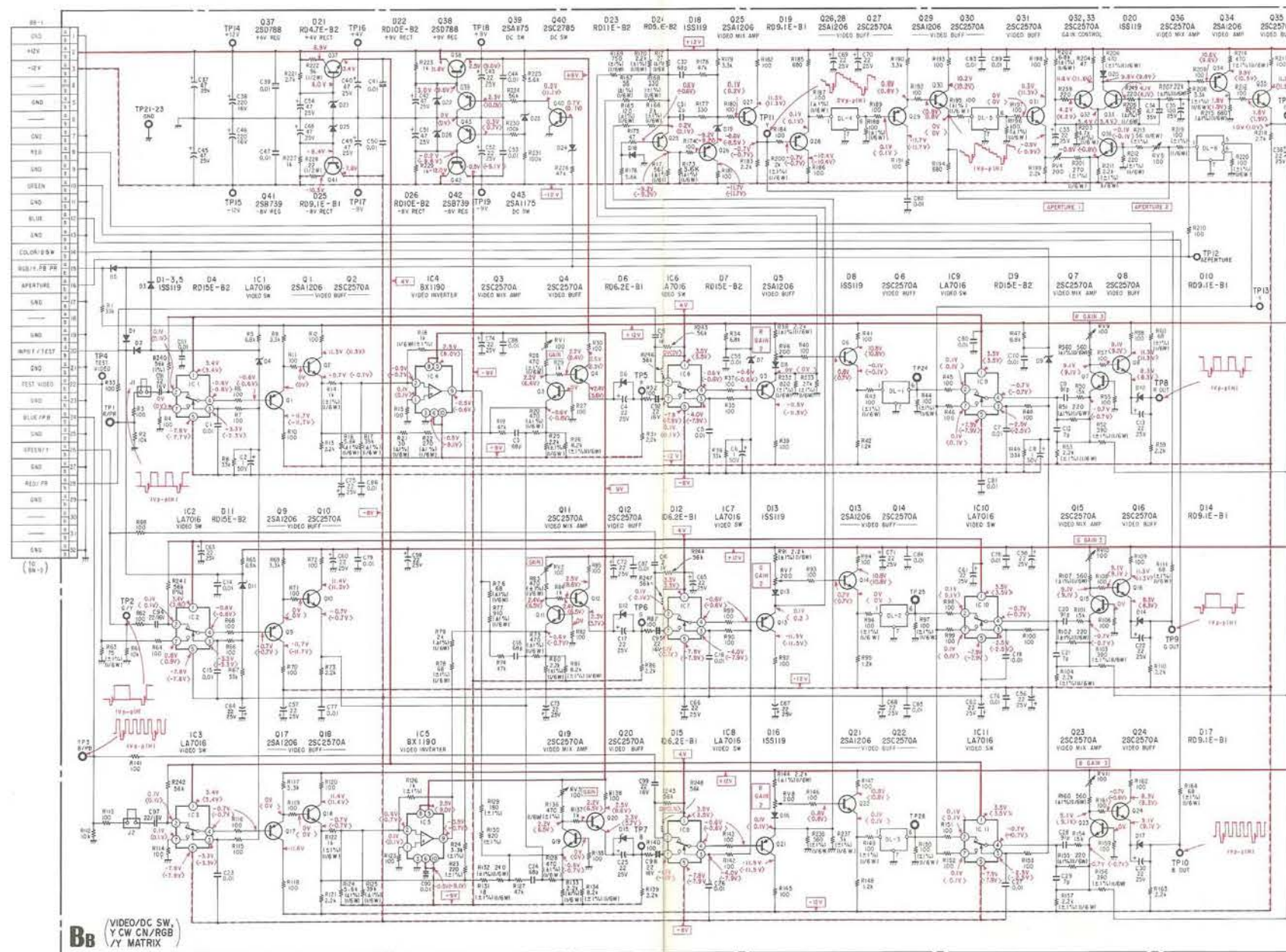
BB

BB board

IC1	LA7016	VIDEO SW
2	LA7016	VIDEO SW
3	LA7016	VIDEO SW
4	BX-1190	VIDEO INVERTER
5	BX-1190	VIDEO INVERTER
6	LA7016	VIDEO SW
7	LA7016	VIDEO SW
8	LA7016	VIDEO SW
9	LA7016	VIDEO SW
10	LA7016	VIDEO SW
11	LA7016	VIDEO SW
Q1	2SA1206	VIDEO BUFF
2	2SC2570A	VIDEO BUFF
3	2SC2570A	VIDEO MIX AMP
4	2SC2570A	VIDEO BUFF
5	2SA1206	VIDEO BUFF
6	2SC2570A	VIDEO BUFF
7	2SC2570A	VIDEO MIX AMP
8	2SC2570A	VIDEO BUFF
9	2SA1206	VIDEO BUFF
10	2SC2570A	VIDEO BUFF
11	2SC2570A	VIDEO MIX AMP
12	2SC2570A	VIDEO BUFF
13	2SA1206	VIDEO BUFF
14	2SC2570A	VIDEO BUFF
15	2SC2570A	VIDEO MIX AMP
16	2SC2570A	VIDEO BUFF
17	2SA1206	VIDEO BUFF
18	2SC2570A	VIDEO BUFF
19	2SC2570A	VIDEO MIX AMP
20	2SC2570A	VIDEO BUFF
21	2SA1206	VIDEO BUFF
22	2SC2570A	VIDEO BUFF
23	2SC2570A	VIDEO MIX AMP
24	2SA1206	VIDEO BUFF
25	2SC2570A	VIDEO BUFF
26	2SC2570A	VIDEO MIX AMP
27	2SC2570A	VIDEO BUFF
28	2SA1206	VIDEO BUFF
29	2SA1206	VIDEO BUFF

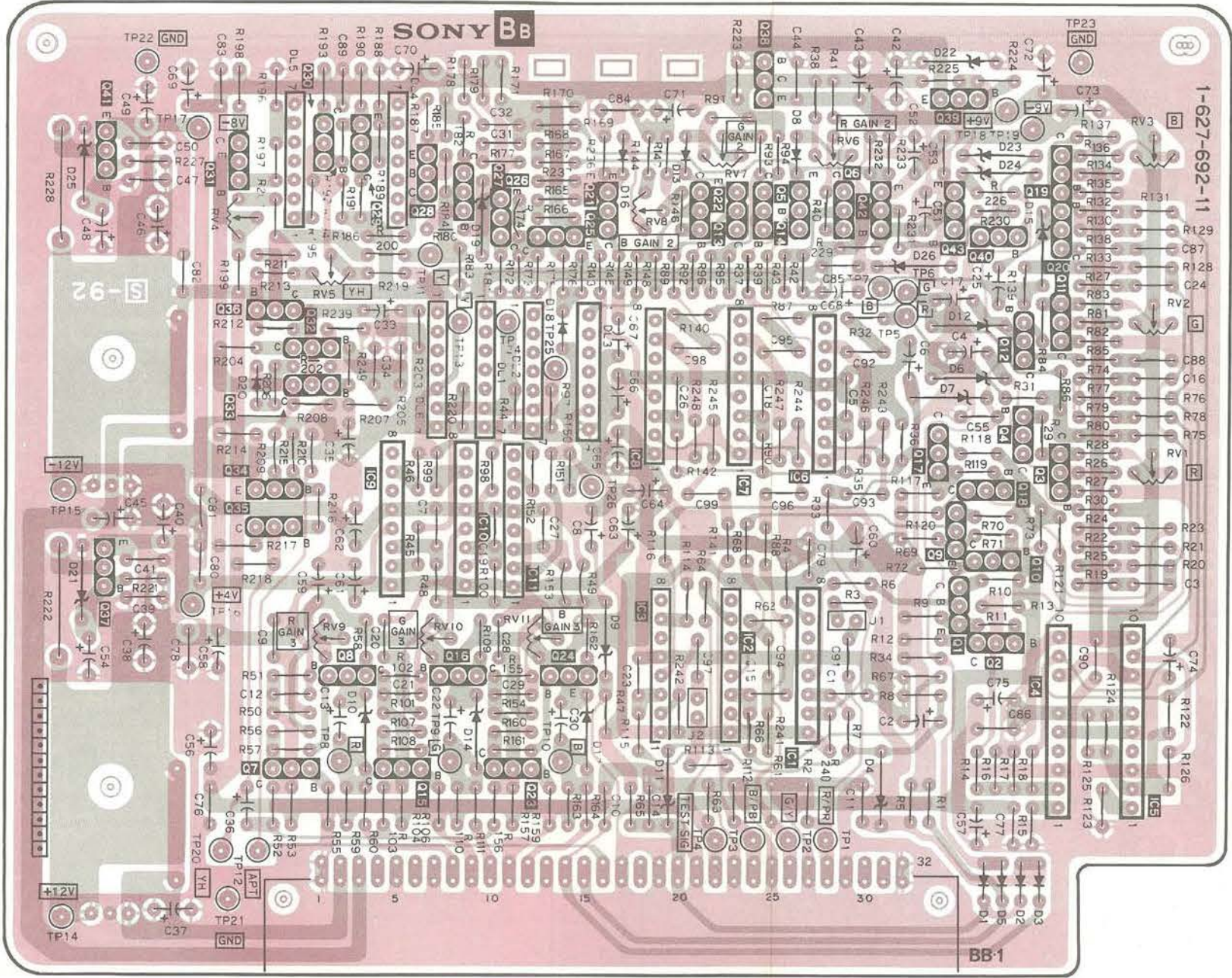
Q30	2SC2570A	VIDEO BUFF
31	2SC2570A	VIDEO BUFF
32	2SC2570A	GAIN CONTROL
33	2SC2570A	GAIN CONTROL
34	2SA1206	VIDEO AMP
35	2SC2570A	VIDEO BUFF
36	2SC2570A	VIDEO MIX AMP
37	2SD788	+4V REG
38	2SD788	+9V REG
39	2SA1175	DC SW
40	2SC2785	DC SW
41	2SB739	-8V REG
42	2SB739	-9V REG
43	2SA1175	DC SW
D1	1SS119	
2	1SS119	
3	1SS119	
4	RD15B2	
5	1SS119	
6	RD6.2EB1	
7	RD15B2	
8	1SS119	
9	RD15B2	
10	RD9.1EB1	
11	RD15B2	
12	RD6.2EB1	
13	1SS119	
14	RD9.1EB1	
15	RD6.2EB1	
16	1SS119	
17	RD9.1EB1	
18	1SS119	
19	RD9.1EB1	
20	1SS119	
21	RD4.7EB2	+4V REG
22	RD10EB2	+9V REG
23	RD11EB2	
24	RD5.6EB2	
25	RD9.1EB1	-8V REG
26	RD10EB2	-8V REG

BB board (Y/CwCn MATRIX, APERTURE CONTROL)



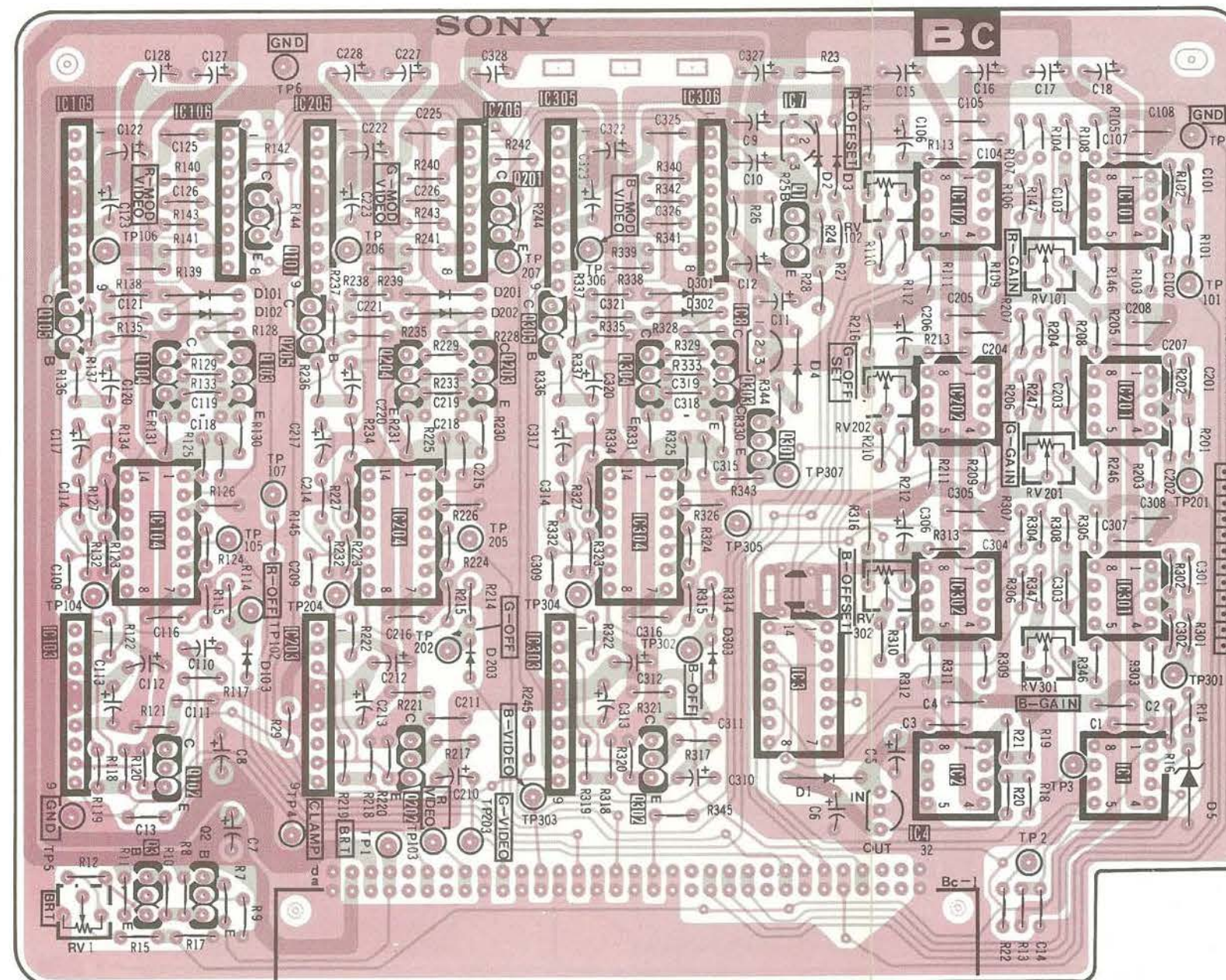
BB board (YCwC_N MATRIX, APERTURE CONTROL)


IC																				8	7	6				4	5
Q	41		31	30	29	28	27	26	25	21		22,13,5	38	14	6	42	39	43	40	12	19	20					
D	25		20																								
ADJ																											
TP	TP15 TP14	TP22	TP17 TP16 RV4 TP20 TP12 TP21	RV5 TP8	TP11,TP13 TP9	TP10							TP4,TP3,TP2,TP1	TP6 TP5	TP7	TP18	TP23 TP19	RV3 RV2 RV1									



BC board (DIGITAL UNIFORMITY)

IC	105	106	205	206	305	306	8	7		102 202 302 2	101 201 301 1
Q	103	104	203	204	303	304	301	3	4		
D	105	103	205	204 202	203	305	304 302	303	301	2 3	5
ADJ TP	TP5 RV1	TP4	TP1	TP103	TP203	TP303	TP302	TP305	TP307	RV102 RV202 RV302	TP7 TP101 TP201 TP301



- : Conductor side pattern
-  : Component side pattern



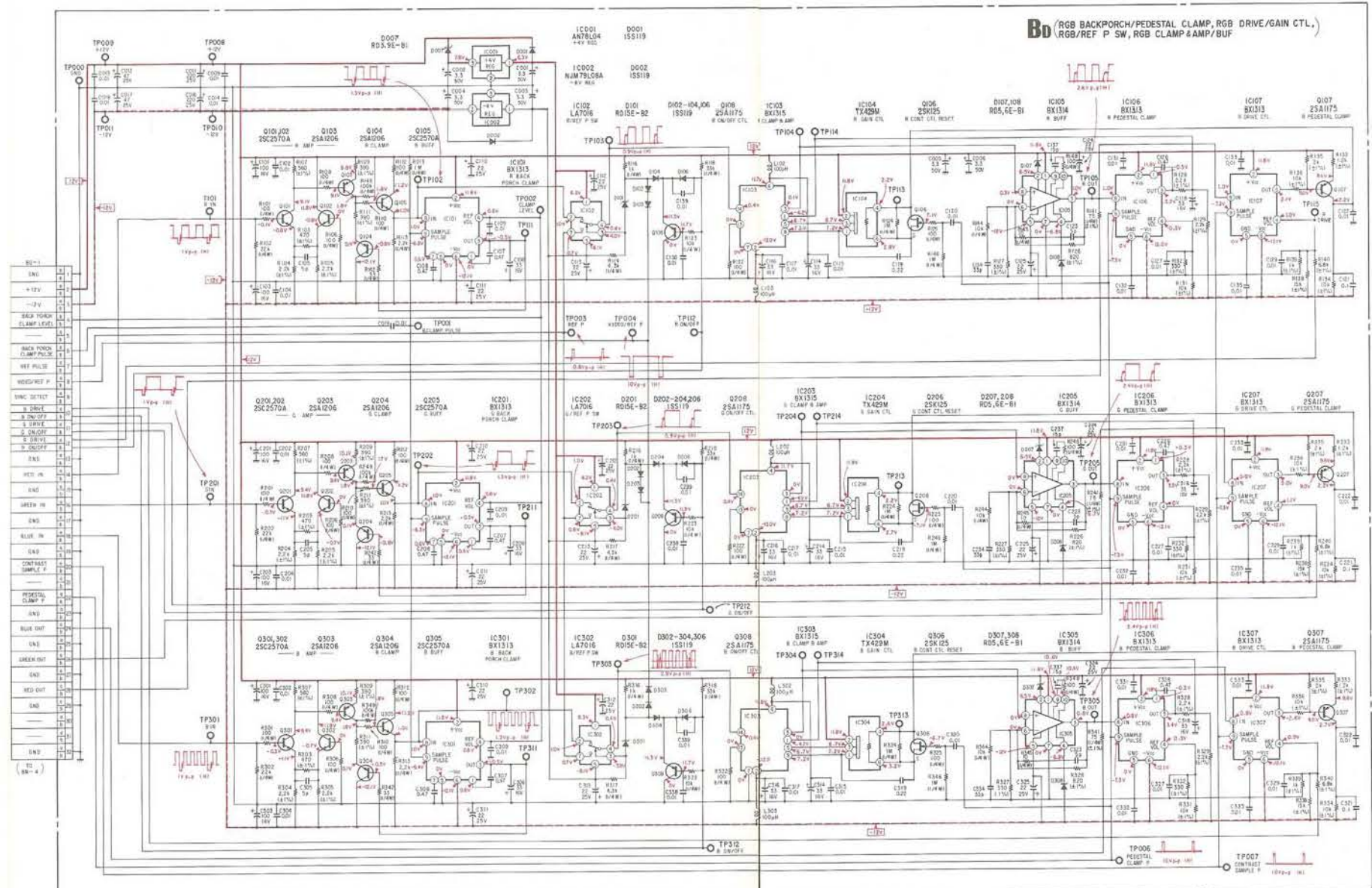
1C1	TL072ACP	BRIGHT LEVEL SHIFT
2	TL072ACP	LINEARIZE
3	CK-718D	CONT SIG ATT
4	AN78L04	+4V REG
7	AN78L04	+4V REG
8	NJ879L08A	-8V REG
101	TL072ACP	LPFF/R CONT ATT
102	TL072ACP	GD DRIVE/LEVEL SHIFT
103	BX-1313	R BACK PORCH CLAMP
104	MC1595L	R VIDEO MODULATION
105	BX-1313	R BACK PORCH CLAMP
106	LA7016	R VIDEO SW
201	TL072ACP	LPFF/G CONT ATT
202	TL072ACP	GD DRIVE/LEVEL SHIFT
203	BX-1313	G BACK PORCH CLAMP
204	MC1595L	G VIDEO MODULATION
205	BX-1313	G BACK PORCH CLAMP
206	LA7016	G VIDEO SW
301	TL072ACP	LPFF/B CONT ATT
302	TL072ACP	GD DRIVE/LEVEL SHIFT
303	BX-1313	B BACK PORCH CLAMP
304	MC1595L	B VIDEO MODULATION
305	BX-1313	B BACK PORCH CLAMP
306	LA7016	B VIDEO SW
Q1	2SA1048TP	DU SW
2	2SA1048TP	BRIGHT BUFF
3	2SC2785TP	BRIGHT BUFF
101	2SA1206	R VIDEO BUFF
102	2SA1206	R VIDEO BUFF
103	2SA1206	R MODULATED VIDEO AMP
104	2SA1206	R MODULATED VIDEO AMP
105	2SC2026	R MODULATED VIDEO BUFF
201	2SA1206	G VIDEO BUFF
202	2SA1206	G VIDEO BUFF
203	2SA1206	G MODULATED VIDEO AMP
204	2SA1206	G MODULATED VIDEO AMP
205	2SC2026	G MODULATED VIDEO BUFF
301	2SA1206	B VIDEO BUFF
302	2SA1206	B VIDEO BUFF
303	2SA1206	B MODULATED VIDEO AMP
304	2SA1206	B MODULATED VIDEO AMP
305	2SC2026	B MODULATED VIDEO BUFF
D1	1S1555	REG PROT
2	1S1555	REG PROT
3	1S1555	SW GATE
4	1S1555	REG PROT
5	RP7-EB2	+7.5V REG
101	1S1555	BIAS
102	1S1555	BIAS
103	1S8119	VIDEO OFF
104	1S1555	BIAS
202	1S1555	BIAS
203	1S8119	VIDEO OFF
301	1S1555	BIAS
302	1S1555	BIAS
303	1S8119	VIDEO OFF

BD

BD board

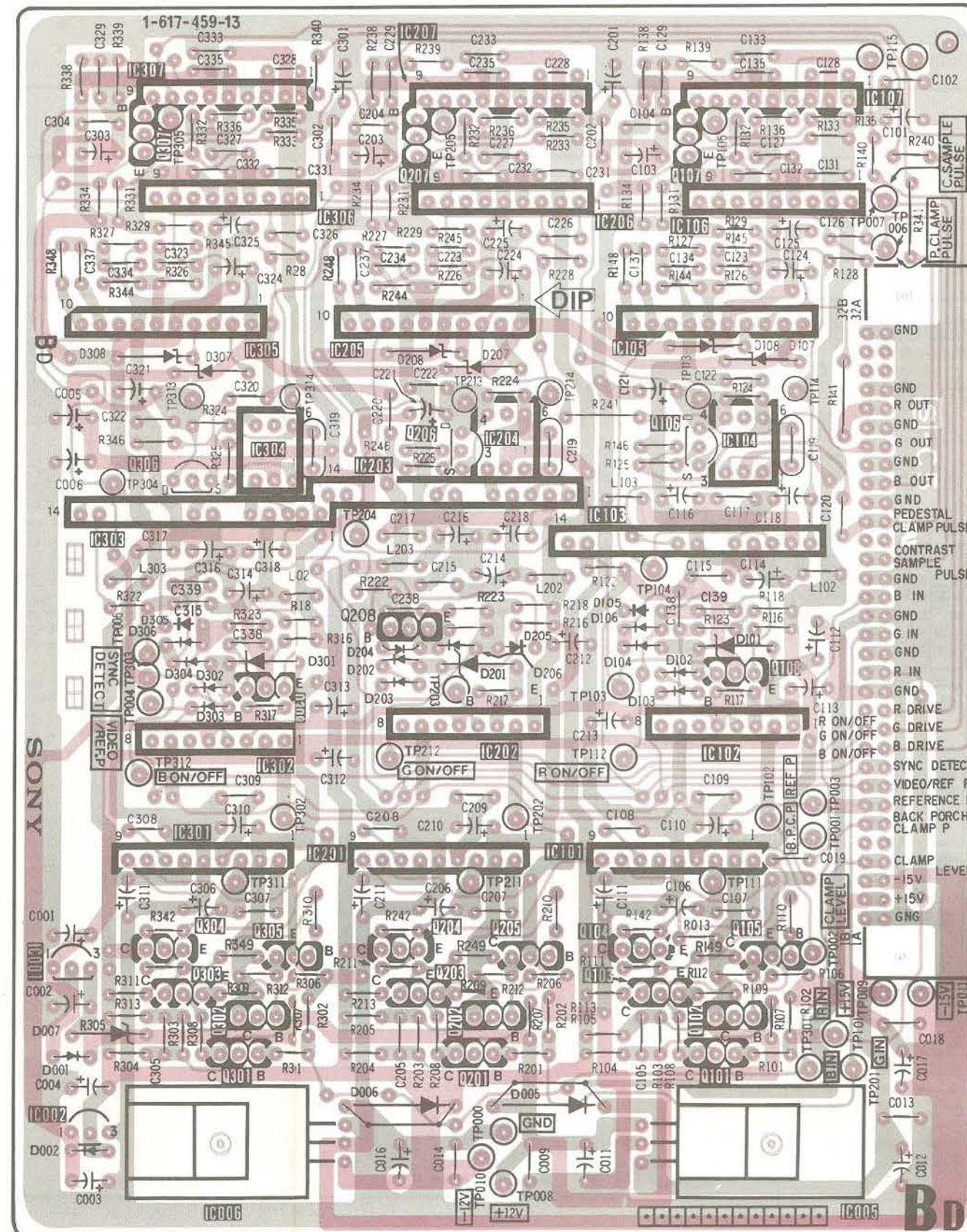
IC001	AN78L04	+4V REG
D002	NJM79L08A	-8V REG
T01	BX-1313	R BACKPORCH CLAMP
T02	LA7016	R/REF P SW
T03	BX-1315	R CLAMP & AMP
T04	TX-429H	R GAIN CTL
T05	BX-1314	R BUFF
T06	BX-1313	R PEDESTAL CLAMP
T07	BX-1313	R DRIVE CTL
T08	BX-1313	G BACKPORCH CLAMP
T09	LA7016	G/REF P SW
T10	BX-1315	G CLAMP & AMP
T11	TX-429H	G GAIN CTL
T12	BX-1314	G BUFF
T13	BX-1313	G PEDESTAL CLAMP
T14	BX-1313	G DRIVE CTL
T15	BX-1313	B BACKPORCH CLAMP
T16	LA7016	B/REF P SW
T17	BX-1315	B CLAMP & AMP
T18	TX-429H	B GAIN CTL
T19	BX-1314	B BUFF
T20	BX-1313	B PEDESTAL CLAMP
T21	BX-1313	B DRIVE CTL
D101	2SC2570A	R AMP
D102	2SC2570A	R AMP
D103	2SA1206	R AMP
D104	2SA1206	R CLAMP
D105	2SC2570A	R BUFF
D106	2SK125	R CONT CTL RESET
D107	2SA1048	R PEDESTAL CLAMP
D108	2SA1048	R ON/OFF CTL
D201	2SC2570A	G AMP
D202	2SC2570A	G AMP
D203	2SA1206	G AMP
D204	2SA1206	G CLAMP
D205	2SC2570A	G CLAMP
D206	2SK125	G CONT CTL RESET
D207	2SA1048	G PEDESTAL CLAMP
D208	2SA1048	G ON/OFF CTL
D301	2SC2570A	B AMP
D302	2SC2570A	B AMP
D303	2SA1206	B AMP
D304	2SA1206	B CLAMP
D305	2SC2570A	B CLAMP
D306	2SK125	B CONT CTL RESET
D307	2SA1048	B PEDESTAL CLAMP
D308	2SA1048	B ON/OFF CTL
D001	1SS119	
D002	1SS119	
D003	RD5.9EB1	
D004	RD15EB2	
D005	1SS119	
D006	1SS119	
D007	1SS119	
D008	1SS119	
D009	1SS119	
D010	1SS119	
D011	1SS119	
D012	1SS119	
D013	1SS119	
D014	1SS119	
D015	1SS119	
D016	1SS119	
D017	1SS119	
D018	1SS119	
D019	1SS119	
D020	1SS119	
D021	1SS119	
D022	1SS119	
D023	1SS119	
D024	1SS119	
D025	1SS119	
D026	1SS119	
D027	1SS119	
D028	1SS119	
D029	1SS119	
D030	1SS119	
D031	1SS119	
D032	1SS119	
D033	1SS119	
D034	1SS119	
D035	1SS119	
D036	1SS119	
D037	1SS119	
D038	1SS119	
D039	1SS119	
D040	1SS119	
D041	1SS119	
D042	1SS119	
D043	1SS119	
D044	1SS119	
D045	1SS119	
D046	1SS119	
D047	1SS119	
D048	1SS119	
D049	1SS119	
D050	1SS119	
D051	1SS119	
D052	1SS119	
D053	1SS119	
D054	1SS119	
D055	1SS119	
D056	1SS119	
D057	1SS119	
D058	1SS119	
D059	1SS119	
D060	1SS119	
D061	1SS119	
D062	1SS119	
D063	1SS119	
D064	1SS119	
D065	1SS119	
D066	1SS119	
D067	1SS119	
D068	1SS119	
D069	1SS119	
D070	1SS119	
D071	1SS119	
D072	1SS119	
D073	1SS119	
D074	1SS119	
D075	1SS119	
D076	1SS119	
D077	1SS119	
D078	1SS119	
D079	1SS119	
D080	1SS119	
D081	1SS119	
D082	1SS119	
D083	1SS119	
D084	1SS119	
D085	1SS119	
D086	1SS119	
D087	1SS119	
D088	1SS119	
D089	1SS119	
D090	1SS119	
D091	1SS119	
D092	1SS119	
D093	1SS119	
D094	1SS119	
D095	1SS119	
D096	1SS119	
D097	1SS119	
D098	1SS119	
D099	1SS119	
D100	1SS119	

BD board (CONTRAST/GAIN CONTROL)



BD board (CONTRAST/GAIN CONTROL)

IC	Q	D	TP
307 207 107	307 207 107		115 305 205 105
306 206 106			007 006
305 205 105		308 208 108 307 207 107	213, 214 313, 314, 113, 114
304 204 104	206, 106		
203 303	306		304 204 104
103		204, 106 306, 202, 104 101 304, 301, 201 302 102 303, 203 103 206	303 004 203 103 212, 112 003 302, 202, 102 001 311, 211, 111 002 009, 011 101 301, 201
302 202 102	308 108		
301 201 101			
001	204, 205 304, 305, 104, 105 303 203 103 302, 202, 102 301, 201, 101	007 001	000 010 008
002	002		

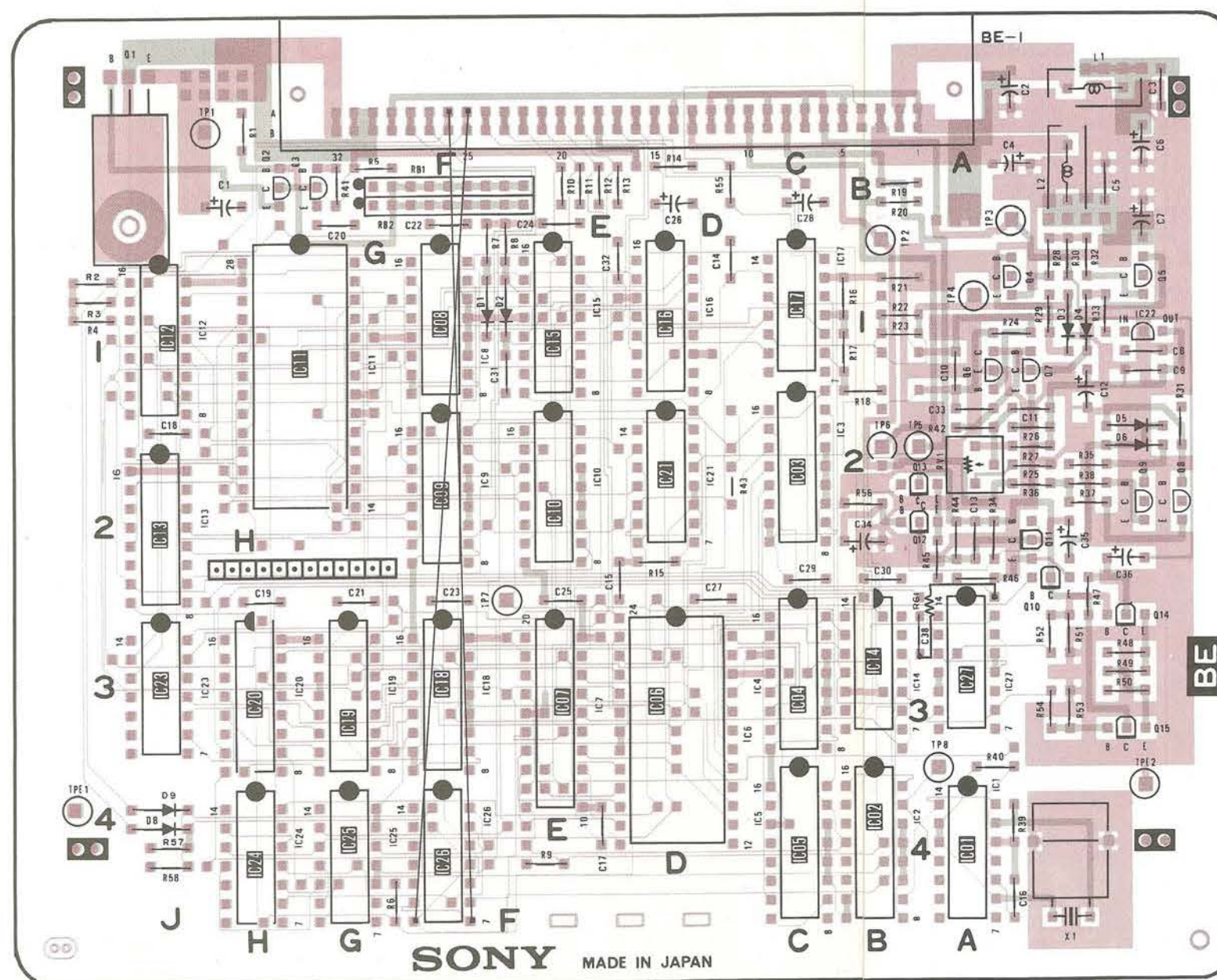


- : Conductor side pattern
- : Component side pattern

BE BE

BE board (BILT-IN SIGNAL GENERATOR)

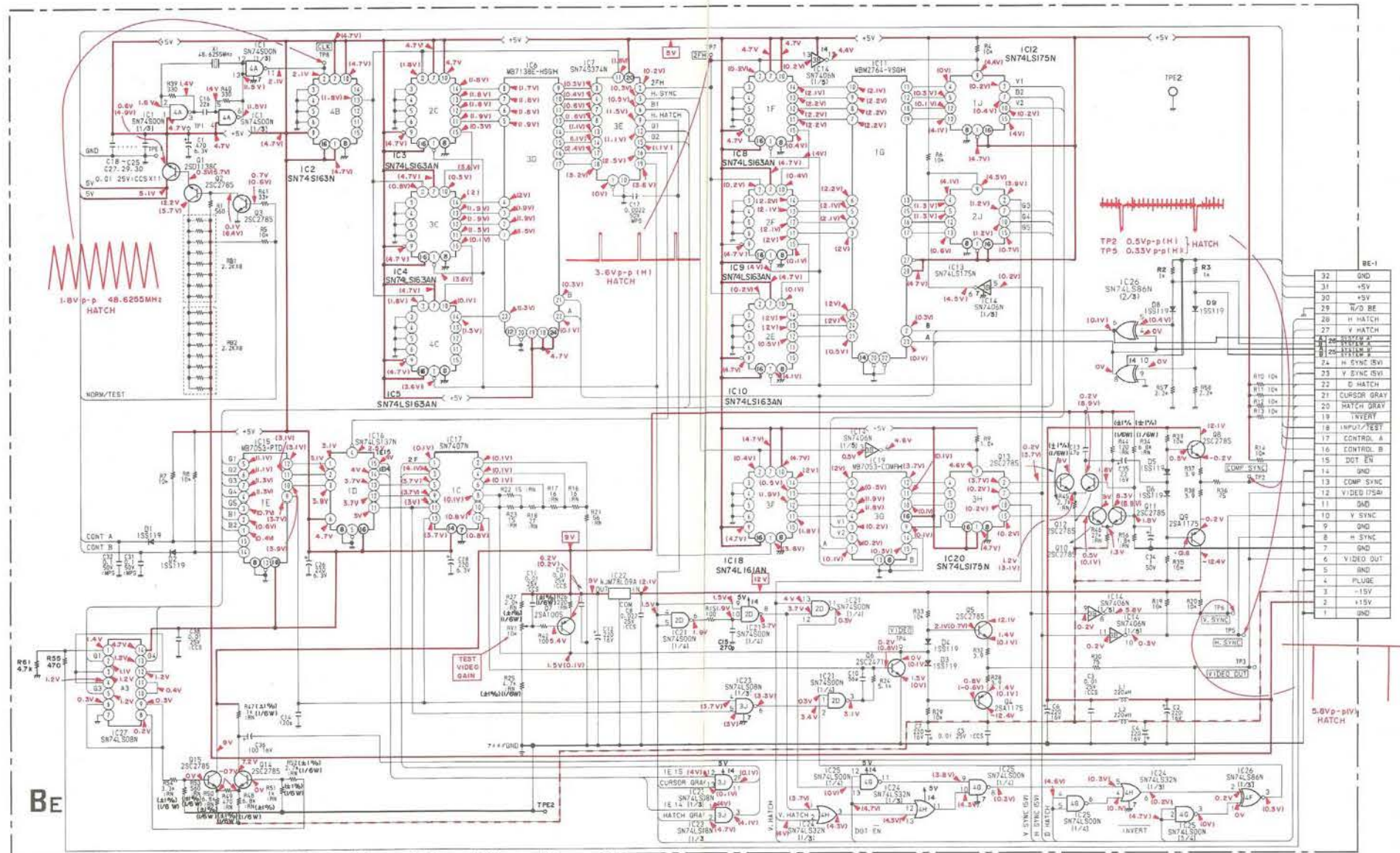
IC Q	1	2	3	IC 8		IC 15	IC 16	IC 17	4		5
	IC 12	IC 11		IC 9	IC 10	IC 21	IC 3	IC 4	IC 14	IC 27	IC 22
	IC 13	IC 20	IC 19	IC 18	IC 7	IC 6	IC 5	IC 2	IC 1	11	9
	IC 23	IC 24	IC 25	IC 26					IC 2	10	14
											15
D	1 2				3 4		5	6			
ADJ TP	TPI				TP7		TP2	TP4	TP3		
	TPE1						TP6	TP5	RVI	TP8	TPE2



- : Conductor side pattern
- : Component side pattern

BE BE

BE board (BILT-IN SIGNAL GENERATOR)



BE

BE

BE board

1	SN74LS00N	OSC
2	SN74LS163N	DIVIDER
3	SN74ALS163AN	ADDRESS ENCODE 1
4	SN74ALS163AN	ADDRESS ENCODE 2
5	SN74ALS163AN	ADDRESS ENCODE 3
6	MB7138E-HSGC	H PULSE GEN
7	SN74S374N	H PULSE LATCH
8	SN74ALS163AN	ADDRESS ENCODE 4
9	SN74ALS163AN	ADDRESS ENCODE 5
10	SN74ALS163AN	ADDRESS ENCODE 6
11	2764-VS6D	V PULSE GEN
12	SN74ALS175N	V PULSE LATCH 1
13	SN74ALS175N	V PULSE LATCH 2
14	SN7406N	OUTPUT BUFF
15	MB7053-PTD	PATTERN ENCODE
16	SN74ALS137N	PATTERN ENCODE
17	SN7407N	LEVEL SELECT
18	SN74ALS161AN	SYNC GEN 2
19	MB7053-COMP B	SYNC GEN 1
20	SN74ALS175N	SYNC LATCH
21	SN74S00N	PULSE GEN
22	NJW78L09A	+9V REG
23	SN74LS08N	CONTROL PULSE GEN 1
24	SN74LS32N	CONTROL PULSE GEN 2
25	SN74LS00N	CONTROL PULSE GEN 3
26	SN74LS86N	CONTROL PULSE GEN 4
27	SN74LS08N	PULSE GEN
Q1	2SD1138	+5V SW1
2	2SC2785	+5V SW2
3	2SC2785	+5V SW3
4	2SA1175	BUFF 3
5	2SC2785	BUFF 1
6	2SC2471	HATCH GEN
7	2SA1005	CURRENT SOURCE
8	2SC2785	BIAS 2
9	2SA1175	BUFF 4
10	2SC2785	SYNC GEN 1
11	2SC2785	SYNC GEN 2
12	2SC2785	SYNC GEN 3
13	2SC2785	SYNC GEN 4
14	2SC2785	PULSE GEN 1
15	2SC2785	PULSE GEN 2
D1	1S5119	PROTECT 1
2	1S5119	PROTECT 2
3	1S5119	BIAS 1
4	1S5119	BIAS 2
5	1S5119	BIAS 3
6	1R5119	BIAS 4
7	1S5119	LEVEL SHIFT 1
8	1S5119	LEVEL SHIFT 2

BF

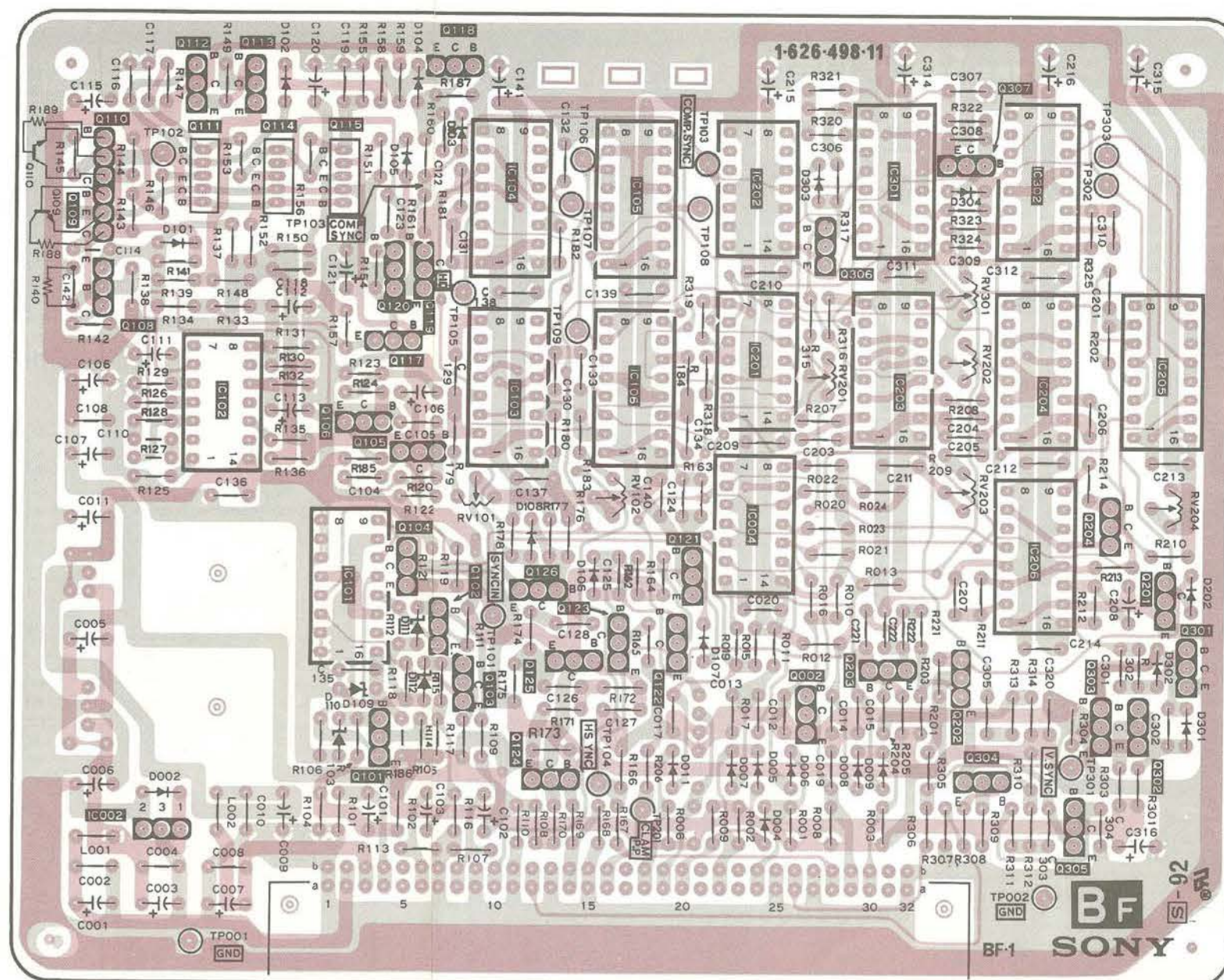
BF

BF board

IC3	LA7016	SYNC SW
4	MC1496P	GAIN CONTROL
5	TC4011UBP	NAND GATE
6	TC4528BP	H SYNC SEP
7	TC4528BP	EQUIVALENT PULSE ELIMINATOR
8	TC4528BP	CLAMP PULSE GENERATOR/H SYNC DETECTOR
9	TC4528BP	H/V SYNC GENERATOR
10	TC4053BP	SYNC SW
11	TC4528BP	H/V SYNC DELAY
12	TC4528BP	VD DETECTOR/CLAMP PULSE GENERATOR
13	TC4053BP	SYNC SW
14	TC4528BP	HD DETECTOR/HD DELAY
Q1	2SA1206	SYNC AMP
2	2SC2570A	SYNC AMP
3	2SC2570A	SYNC AMP
4	2SA979	COMPARATOR
5	2SC2785	BUFF
6	2SA1175	BUFF
7	2SA979	COMPARATOR
9	2SA979	COMPARATOR
10	2SC2785	LIMITTER
11	2SA1175	BUFF
12	2SC2785	BUFF
13	2SK125	CLAMP
14	2SC2785	COMPARATOR
15	2SC2785	COMPARATOR
16	2SA1175	BUFF
17	2SC2785	BUFF
18	2SA1175	BUFF
19	2SC2785	BUFF
20	2SA1175	V SYNC SEP
21	2SC2785	BUFF
22	2SC2785	BUFF
23	2SA1175	BUFF
24	2SC2785	BUFF
25	2SA1175	BUFF
26	2SC2785	BUFF
27	2SA1175	BUFF
28	2SA1175	VD AMP
29	2SA1175	HD AMP
30	2SA1175	
31	2SA1175	POWER ON RESET
D3	RD3.0EB1	
4	1SS119	
5	1SS119	
6	1SS119	
7	1SS119	
9	1SS119	
10	1SS119	
11	1SS119	
12	RD11EB1	
13	1SS119	
14	1SS119	
15	1SS119	
16	1SS119	
17	1SS119	
18	1SS119	
19	1SS119	
20	1SS119	
21	1SS119	
22	1SS119	
23	1SS119	
24	1SS119	
25	1SS119	
26	1SS119	
27	1SS119	
28	1SS119	
29	1SS119	
30	1SS119	

BF board (SYNC PROCESSOR)

IC	102	101	104	105	202	301	302	205
	002	101	103	106	201	203	204	206
					004			
Q	110	112	113	115	118	119	307	
	109	111	114	120	117			
	108			106	105		204	201
				101	104	102, 103	303	301
					126, 125	123	305	302
					122	002	202	
D	101	102	104	103	108	106	304	
						107		202
	002	110	112		011	007	005	302
					004	006	008, 009	301
ADJ	TP102		TP105	TP106	TP107	TP103	RV201	TP303
			RV101	TP109	RV102	TP108	RV301	TP302
TP	TP001		TP101	TP104	TP201		RV202	RV204
							RV203	TP301
								TP002



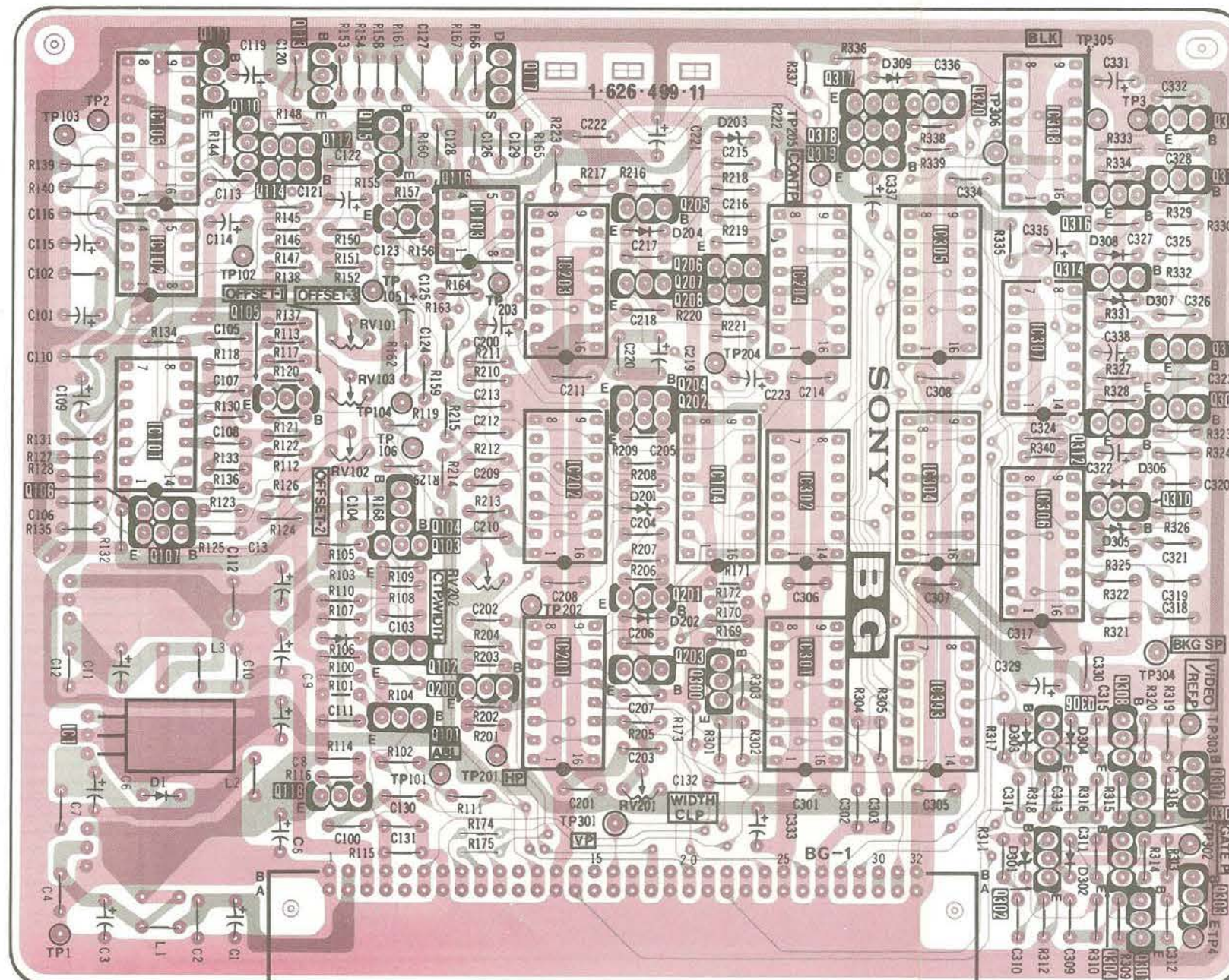
- : Conductor side pattern
- : Component side pattern

tern
attern

BG BG

BG board (PULSE GENERATOR)

IC	105 102 101				103	203 202 201		104	204 302 301	305 304 303	308 307 306			
Q		111 106 107	110 112 114 105	113 116 104 103 102	115 118 101	117 200	205 207 204 202 201 203	206 208	317 318 319	320		315 313 311 309 307 303		
D							204 201 202	203		309		308 303 304 307 301 302 305 306		
RV				101 103 102		202	201							
TP	103 2 1	102	105,104 106	101	203 201 202	204 205	306	305 3	303 302 304 4					

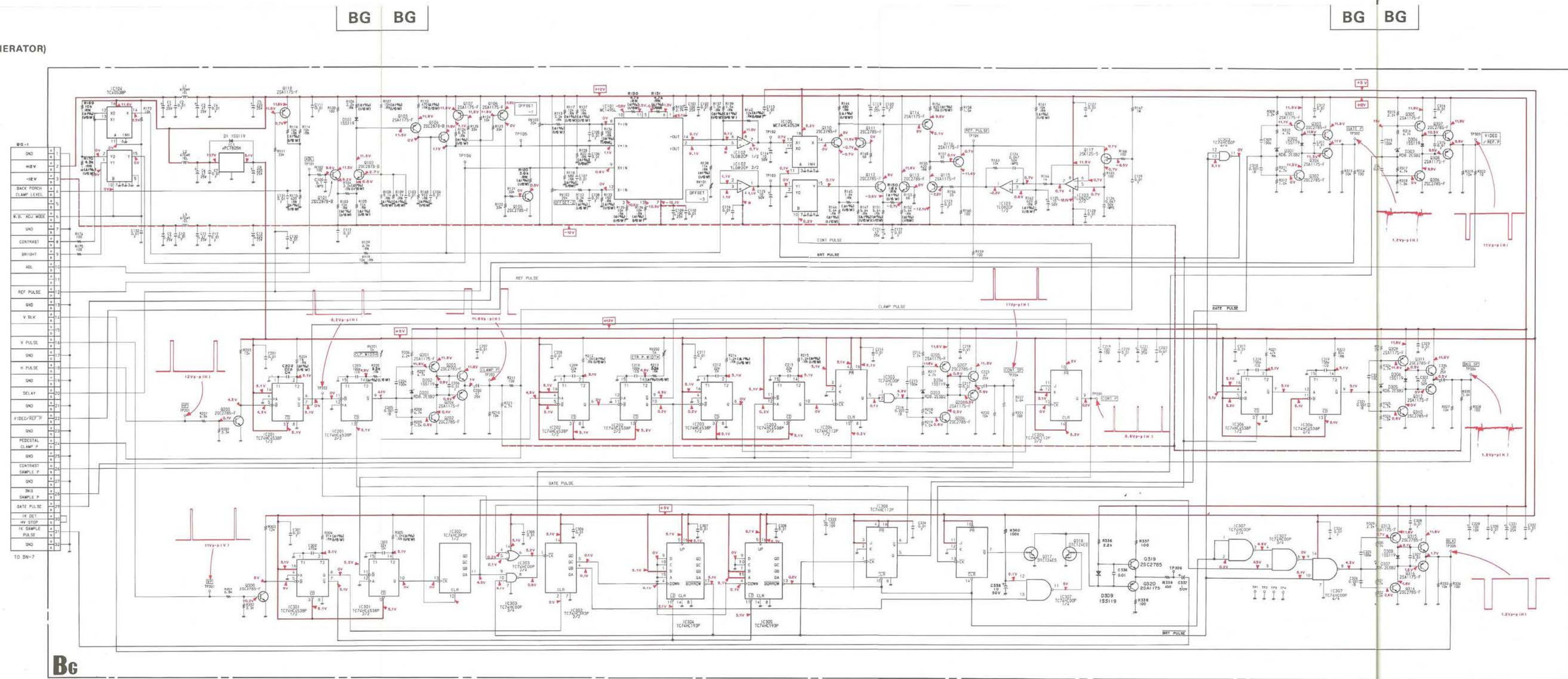


BG board

IC101	MC1495L	BRT P CTL
102	TL082CP	REF P GEN
103	TL082CP	REF P CLAMP
104	TC4053BP	PEDESTAL LEVEL SW
105	MC74HC4053N	REF P GEN
201	TC74HC4538P	COUNTER CLK GEN
202	TC74HC4538P	BRT P TM GEN
203	TC74HC4538P	PULSE GEN
204	TC74HC112P	CONT SAMPLE P GEN & CLAMP P GEN
301	TC74HC4538P	SAMPLE P GEN
302	TC74HC393P	BRT P GEN
303	TC74HC00P	BRT P GEN
304	TC74HC193P	BRT P GEN
305	TC74HC193P	BRT P GEN
306	TC74HC4538P	BKG SP GEN
307	TC74HC00P	BLK P GEN
308	TC74HC112P	GATE P GEN/IK DET
Q101	2SC2785	ABL
102	2SC2785	ABL
103	2SA1175	ABL
104	2SC2785	ABL
105	2SC2785	DELAY
106	2SA1175	DELAY
107	2SA1175	DELAY
110	2SC2785	REF P GEN
111	2SC2785	REF P GEN
112	2SC2785	REF P GEN
113	2SC2785	REF P GEN
114	2SA1175	REF P GEN
115	2SA1175	REF P CLAMP
116	2SA1175	REF P CLAMP
117	2SK125-5	REF P CLAMP
118	2SA1175	BACK PORCH CLAMP
200	2SC2785	HP BUFF
201	2SA1175	CLAMP P GEN
202	2SC2785	CLAMP P GEN
203	2SC2785	CLAMP P GEN
204	2SA1175	CLAMP P GEN
205	2SA1175	CONT P TIMING GEN
206	2SC2785	CONT P TIMING GEN
207	2SC2785	CONT P
208	2SA1175	CONT P
300	2SC2785	VP BUFF
301	2SA1175	BRT P TIMING GEN
302	2SC2785	BRT P TIMING GEN
303	2SC2785	BRT P TIMING GEN
304	2SA1175	BRT P TIMING GEN
305	2SA1175	VIDEO/REEP SEL CONT
306	2SC2785	VIDEO/REEP SEL CONT
307	2SC2785	VIDEO/REEP SELECTOR CONTROL
308	2SA1175	VIDEO/REEP SELECTOR CONTROL
309	2SA1175	BKG SAMPLE P GEN
310	2SC2785	BKG SAMPLE P GEN
311	2SC2785	BKG SAMPLE P GEN
312	2SA1175	BKG SAMPLE P GEN
313	2SA1175	BLK P GEN
314	2SC2785	BLK P GEN
315	2SC2785	BLK P GEN
316	2SA1175	BLK P GEN
317	DTC124ES	IK SAMPLE P GEN
318	DTC124ES	IK SAMPLE P GEN
319	DTC124ES	IK SAMPLE P GEN
320	DTC124ES	IK SAMPLE P GEN
D1	1SS119	
101	1SS119	
201	1SS119	
203	RD8.2ES-B2	
204	1SS119	
301	RD8.2ES-B2	
302	1SS119	
303	RD8.2ES-B2	
304	1SS119	
305	RD8.2ES-B2	
306	1SS119	
307	RD8.2ES-B2	
308	1SS119	

- : Conductor side pattern
- : Component side pattern

BG board (PULSE GENERATOR)



Bc

5-53

5-54

5-55-1

5-55-2

BN


BN board (SIGNAL SYSTEM MOTHER BOARD)



BN (SIGNAL SYSTEM MOTHER BOARD)

BN



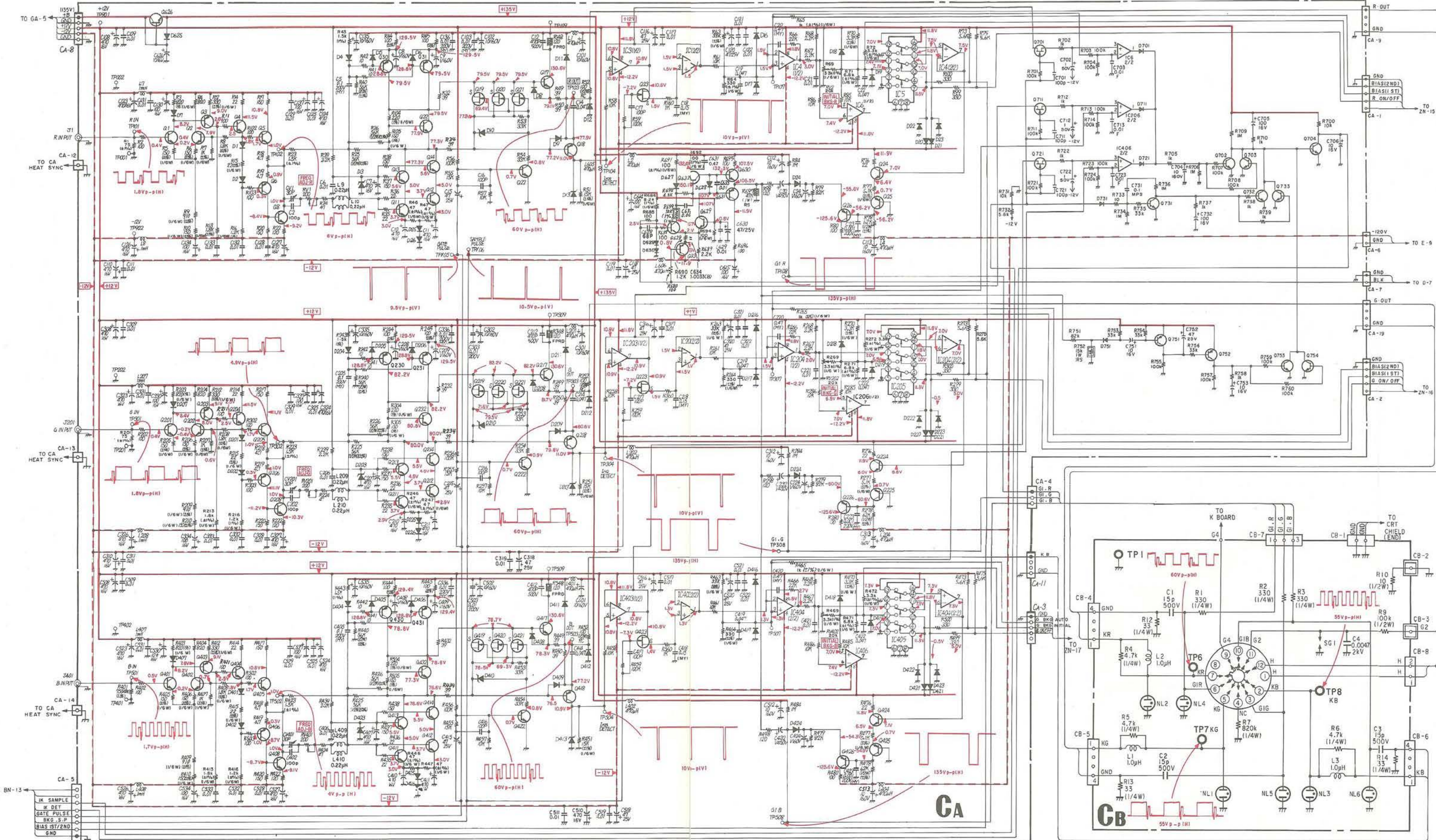
-  : Conductor side pattern
- : Component side pattern

CA, CB CA, CB

CA, CB

CA board (VIDEO OUTPUT) CB board CRT SOCKET

CA board

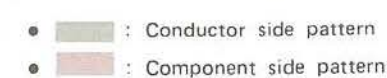


TC3	TL082CP	1KR DETECTOR	Q30	2SA1406	R AMP 2	D11	15583
4	TL082CP	ERROR AMP/BUFF	31	2SA1406	R AMP 2	12	15583
5	TC4053BP	R GT SW	32	2SC3600	BIAS	13	RD11EB2
6	TL082CP	COMPARATOR	201	2SC2570A	G AMP 1	16	155119
203	TL082CP	1KG DETECTOR	202	2SC2570A	G AMP 1	17	155119
204	TL082CP	ERROR AMP/BUFF	203	2SA1206	G AMP 1	18	155119
205	TC4053BP	R GT SW	204	2SC2570A	G AMP 1	19	155119
403	TL082CP	1KG DETECTOR	205	2SC2570A	G AMP 1	20	155119
404	TL082CP	ERROR AMP/BUFF	206	2SA1206	G AMP 1	21	155119
405	TC4053BP	R GT SW	208	2SC2570A	G AMP 1	22	155119
406	TL082CP	COMPARATOR	211	2SC3595	G AMP 2	23	155119
			212	2SC3595	G AMP 2	24	V196
G1	2SC2570A	R AMP 1	213	2SC3600	G AMP 2	25	155119
2	2SC2570A	R AMP 1	214	2SC3600	G AMP 2	26	155119
3	2SA1206	R AMP 1	217	2SC3601	G VIDEO OUT	27	155119
4	2SC2570A	R AMP 1	218	2SA1407	G VIDEO OUT	28	155119
5	2SC2570A	R AMP 1	219	2SK125	G GATE	29	155119
6	2SA1206	R AMP 1	220	2SK125	G GATE	201	155119
8	2SC2570A	R AMP 1	221	2SK125	G GATE	202	155119
11	2SC3595	R AMP 2	222	2SC2551	G GATE	203	RD5.6EB2
12	2SC3595	R AMP 2	223	2SK125	1KG DETECTOR	204	15583
13	2SK3600	R AMP 2	224	2SC2785	G GT AMP	205	155119
14	2SC3600	R AMP 2	225	2SA1208	G GT AMP	206	155119
17	2SC3601	R VIDEO OUT	226	2SA1208	G GT AMP	207	155119
19	2SA1407	R VIDEO OUT	228	2SC2785	COMPARATOR	208	155119
20	2SK125	R GATE	230	2SA1406	G AMP 2	209	155119
20	2SK125	R GATE	231	2SA1406	G AMP 2	210	RD11EB1
21	2SK125	R GATE	232	2SC3600	BIAS	211	15583
22	2SC2551	R GATE	401	2SC2570A	B AMP 1	212	15583
23	2SK125	1KR DETECTOR	402	2SC2570A	B AMP 1	213	RD11EB2
24	2SC2785	R GT AMP	403	2SA1206	B AMP 1	216	155119
25	2SK1208	R GT AMP	404	2SC2570A	B AMP 1	217	155119
26	2SA1208	R GT AMP	405	2SC2570A	B AMP 1	218	155119
28	2SC2785	COMPARATOR	406	2SA1206	B AMP 1	219	155119
			408	2SC2570A	B AMP 1	220	155119
			411	2SC3595	B AMP 2	221	155119
			412	2SC3595	B AMP 2	222	155119
			413	2SC3600	B AMP 2	223	155119
			414	2SK3600	B AMP 2	224	V196
			417	2SC3601	B VIDEO OUT	225	155119
			418	2SA1407	B VIDEO OUT	226	155119
			419	2SK125	B GATE	227	155119
			420	2SK125	B GATE	228	155119
			421	2SK125	B GATE	229	155119
			422	2SC2551	B GATE	201	155119
			423	2SK125	1KB DETECTOR	402	155119
			424	2SC2785	R GT AMP	403	RD5.6EB2
			425	2SC1208	R GT AMP	404	155119
			426	2SA1208	R GT AMP	405	155119
			428	2SC2785	COMPARATOR	406	155119
			430	2SA1406	B AMP 2	407	155119
			431	2SA1406	B AMP 2	408	155119
			432	2SC3600	BIAS	409	155119
			435	2D98B2	+B REG	410	RD9.1EB1
			438	2SC3600	BLK P AMP	411	15583
			439	2SC3600	BLK P AMP	412	15583
			450	2SC3600	BLK P AMP	413	RD11EB2
			631	2SA1406	BLK P AMP	416	155119
			632	2SA1406	BLK P AMP	417	155119
			633	2SA1175	BLK P AMP	418	155119
						419	155119
B1						420	155119
2						421	155119
3						422	155119
4						423	155119
5						424	V196
6						425	155119
7						426	155119
8						427	155119
9						428	155119
10						429	155119
						430	V196
						431	15583
						432	155119
						433	155119
						434	155119
						435	155119
						436	155119
						437	155119
						438	155119
						439	155119
						440	155119
						441	155119
						442	155119
						443	155119
						444	155119
						445	155119
						446	155119
						447	155119
						448	155119
						449	155119
						450	155119
						451	155119
						452	155119
						453	155119
						454	155119
						455	155119
						456	155119
						457	155119
						458	155119
						459	155119
						460	155119
						461	155119
						462	155119
						463	155119
						464	155119
						465	155119
						466	155119
						467	155119
						468	155119
						469	155119
						470	155119
						471	155119
						472	155119
						473	155119
						474	155119
						475	155119
						476	155119
						477	155119
						478	155119
						479	155119
						480	155119
						481	155119
						482	155119
						483	155119
						484	155119
						485	155119
						486	155119
						487	155119
						488	155119
						489	155119
						490	155119
						491	155119
						492	155119
						493	155119
						494	155119
						495	155119
						496	155119
						497	155119
						498	155119
						499	155119
						500	155119

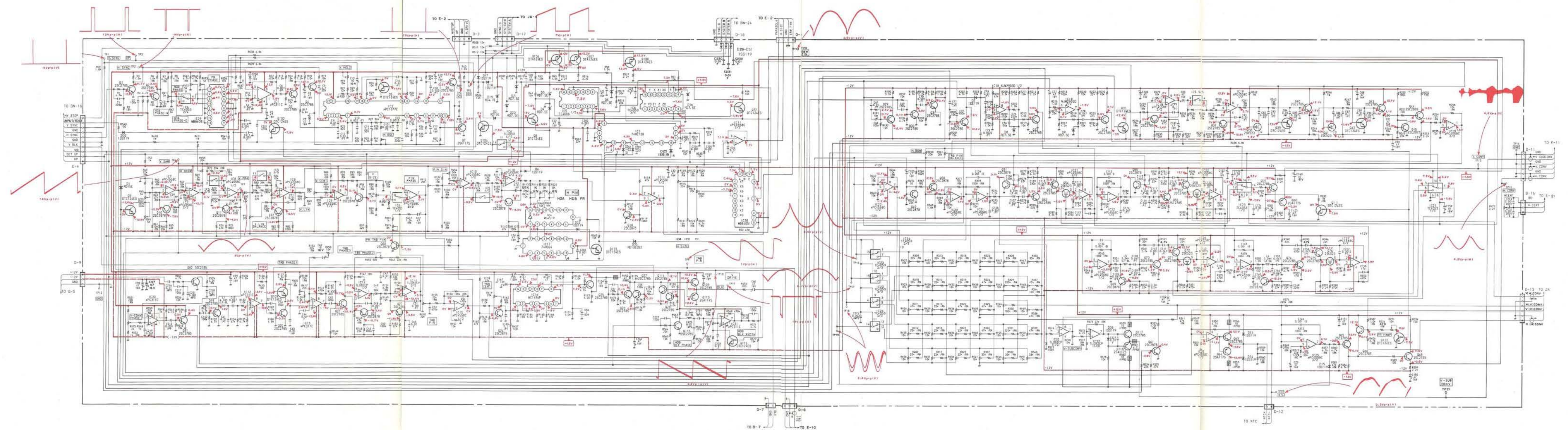
D



30	2SC2785	H BLK 2
31	2SC2785	W BLK 3
32	2SC2785	CONV DRIVE 1
33	2SC2785	CLAMP P
34	2SC2785	CONV DRIVE 2
35	DTIC124ES	FV SW
36	2SC2785	SW1
37	2SC2785	SW2
38	2SK523L1	CLP SW4
39	DTIC124ES	FV SW
40	2SC2785	BUFF 2
41	2SK523L1	CLP SW4
42	DTIC124ES	FV SW
43	2SC2785	BUFF 3
44	2SC2785	BUFF 1
45	2SC2878	CLAMP 1
49	2SC2878	CLAMP 2
50	2SC2878	BUFF 2
51	2SC2878	SW10
52	2SC2785	AMP 1
53	2SC2785	BUFF 4
54	2SK523L1	CLP SW1
55	2SC2878	SW11
56	2SC2785	AMP 2
57	2SC2785	BUFF 5
58	2SK523L1	CLP SW2
59	2SC2785	BUFF 6
60	2SA1175	BUFF 2
61	2SC2878	SW12
63	2SC2785	NTC OUT
64	2SA1175	NTC OUT
65	2SC2785	BUFF 7
66	2SC2785	BUFF 8
68	2SC2785	BUFF 9
69	2SC2878	SW13
70	2SC2785	AMP 3
71	2SC2785	BUFF 10
72	2SK523L1	CLP SW3
73	2SC2878	SW14
74	2SC2785	AMP 4
75	2SC2785	BUFF 11
76	2SK523L1	CLP SW4
77	DTIC124ES	
80	2SC2878	PROG SW
81	2SC2785	BUFF 12
82	2SC2785	BUFF 13
102	DTIC124ES	
103	DTIC124ES	
105	DTIC124ES	
106	DTA124ES	
107	DTA124ES	
108	DTA124ES	
109	2SC2785	AMP 5
110	2SA1175	AMP 1
111	DTIC124ES	PROG SW
112	DTIC124ES	PROG SW
113	DTIC124ES	
114	2SC2785	COMPOSITE BLANKING
115	2SC2785	HDB BLANKING
116	DTIC124ES	HDB SW
117	2SC2785	AMP
118	2SC2785	AMP



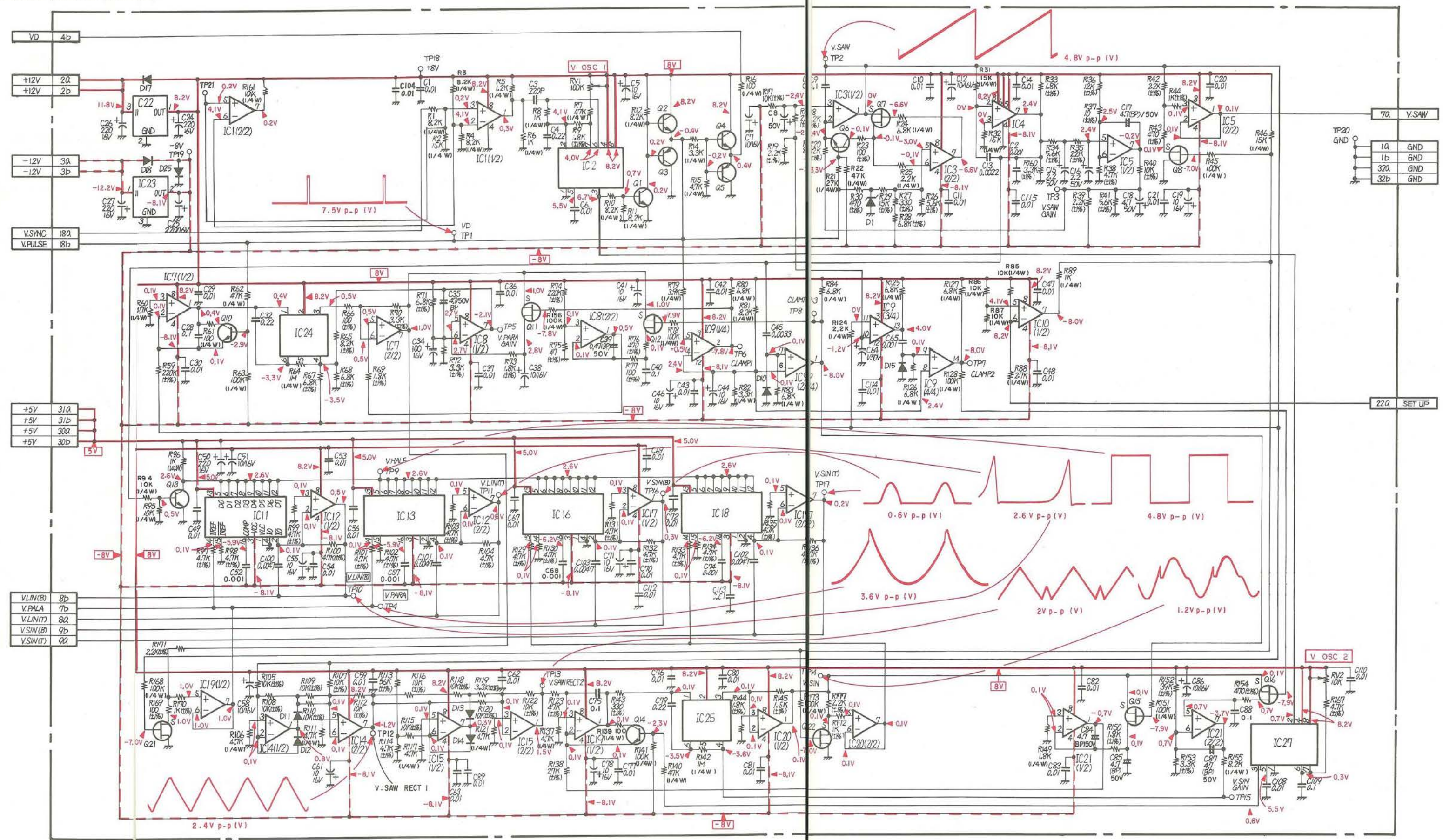
D board (DEFLECTION SYSTEM CONTROL, CONVERGENCE)



DA board

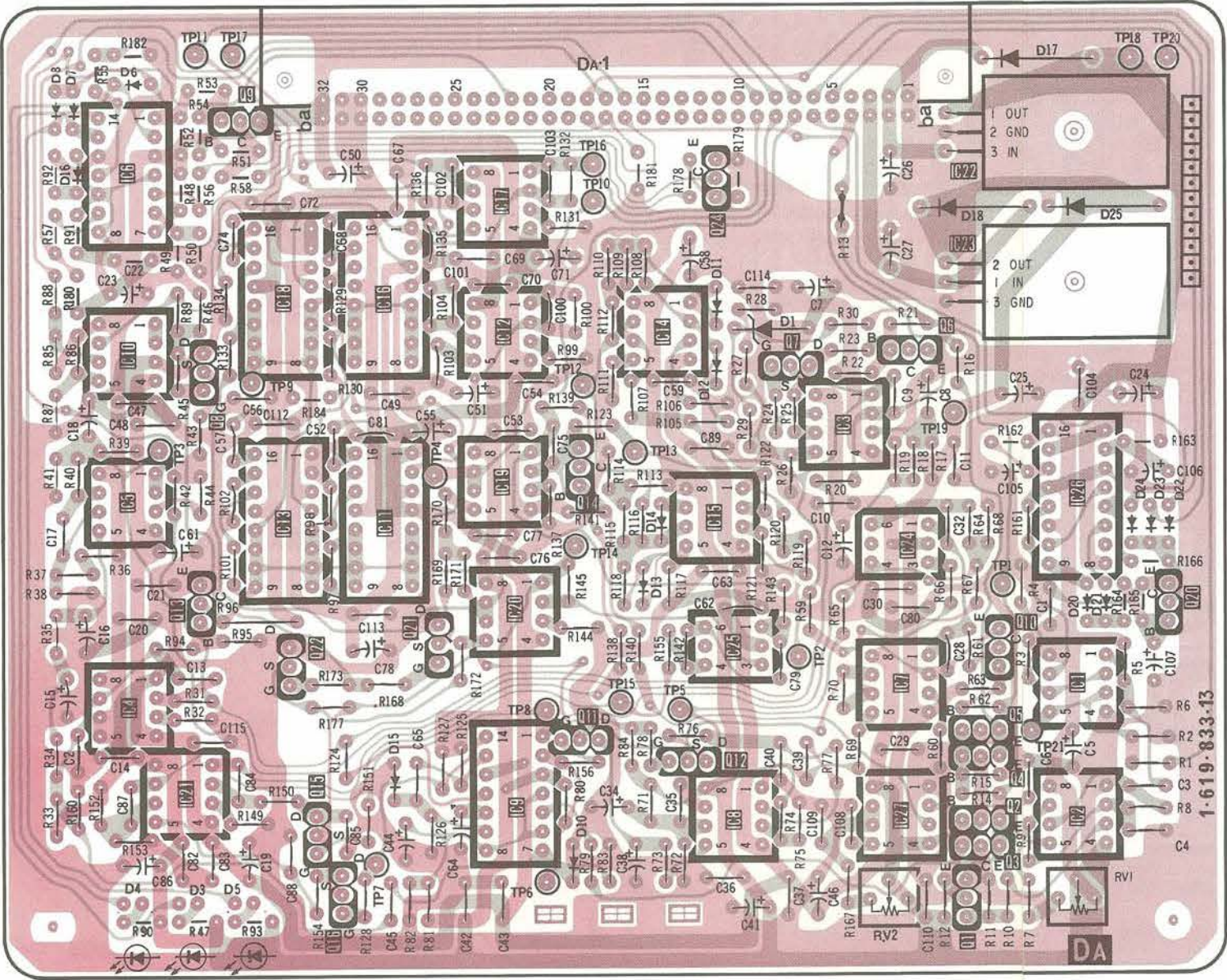
IC1	uPC393C	V SYNC COMPARTOR
2	uPC1555C	VD GEN 1
3	uPC4558C	V SAW GNE 2
4	uPC311C	V HALF GEN
5	uPC4558C	V SAW BUFFER
7	uPC4558C	V PARA GEN 2
8	uPC4082C	V PARA CLAMP
9	uPC339C	CLAMP PULSE GEN
10	uPC393C	SET UP COMPARTOR
11	uPC624C	V LIN (B) GEN
12	uPC4558C	V LIN AMP (T & B)
13	uPC624C	V LIN (T) GEN
14	uPC4558C	V SAW RECT AMP 1
15	uPC4558C	V SAW RECT AMP 2
16	uPC624C	V SIN (B) GEN
17	uPC4558C	V SIN AMP (T & B)
18	uPC624C	V SIN (T) GEN
19	uPC4558C	V SIN GEN
20	uPC4558C	V SIN GEN
21	uPC4082C	V SIN CLAMP
22	NJM78M08A	+8V REG
23	NJM78M08A	-8V REG
24	TX-429M	V PARA GAIN CONTROL
25	TX-429M	V SIN GAIN CONTROL
27	uPC1555C	VD GEN 2
Q1	2SC2785	VD AMP
2	2SC2785	VD BUFFER 1
3	2SA1175	VD BUFFER 2
4	2SC2785	VD BUFFER 3
5	2SA1175	VD BUFFER 4
6	2SC2785	V SAW GEN 1
7	2SK523	V SAW GEN 2
8	2SK523	SET UP (V SAW)
9	2SC2785	
10	2SC2785	V PARA GEN 1
11	2SK523	V PARA GAIN
12	2SK523	V PARA CLAMP
13	2SC2785	V HALF SW
14	2SC2785	V SIN GEN 1
15	2SK523	V SIN CLAMP
16	2SK523	V SIN GAIN
21	2SK523	SET UP (V PARA)
22	2SK523	SET UP (V SIN)
D1	R05.1EN1	VD CLIP
10	1SS119	CLAMP PULSE LIMMETER 1
11	1SS119	V SAW RECT 1
12	1SS119	V SAW RECT 2
13	1SS119	V SAW RECT 3
14	1SS119	V SAW RECT 4
15	1SS119	CLAMP PULSE LIMMETER 2
17	V19G	+8V REG PROT
18	V19G	-8V REG PROT 1
25	V19G	-8V REG PROT 2

DA board (V. GENERATR)



DA board (V. GENERATOR)

IC	10 5 4	18 13	16 11	17 12 19 20 9	14	15 25 8	3	24 7 27	22 23
Q	21	8 13	22	21	14 11	12	7 6	10 5 4 3	
D		15 16		15	10	13 14	11 12	18 17	25
ADJ TP	TPII TPI7				TPI6 TPI0 TPI2 TPI3				TPI8 TP20
	TP3		TP4	TP7	TP8 TP6	TP15 TP5	TP2	RV2	TPI TP21 RV1

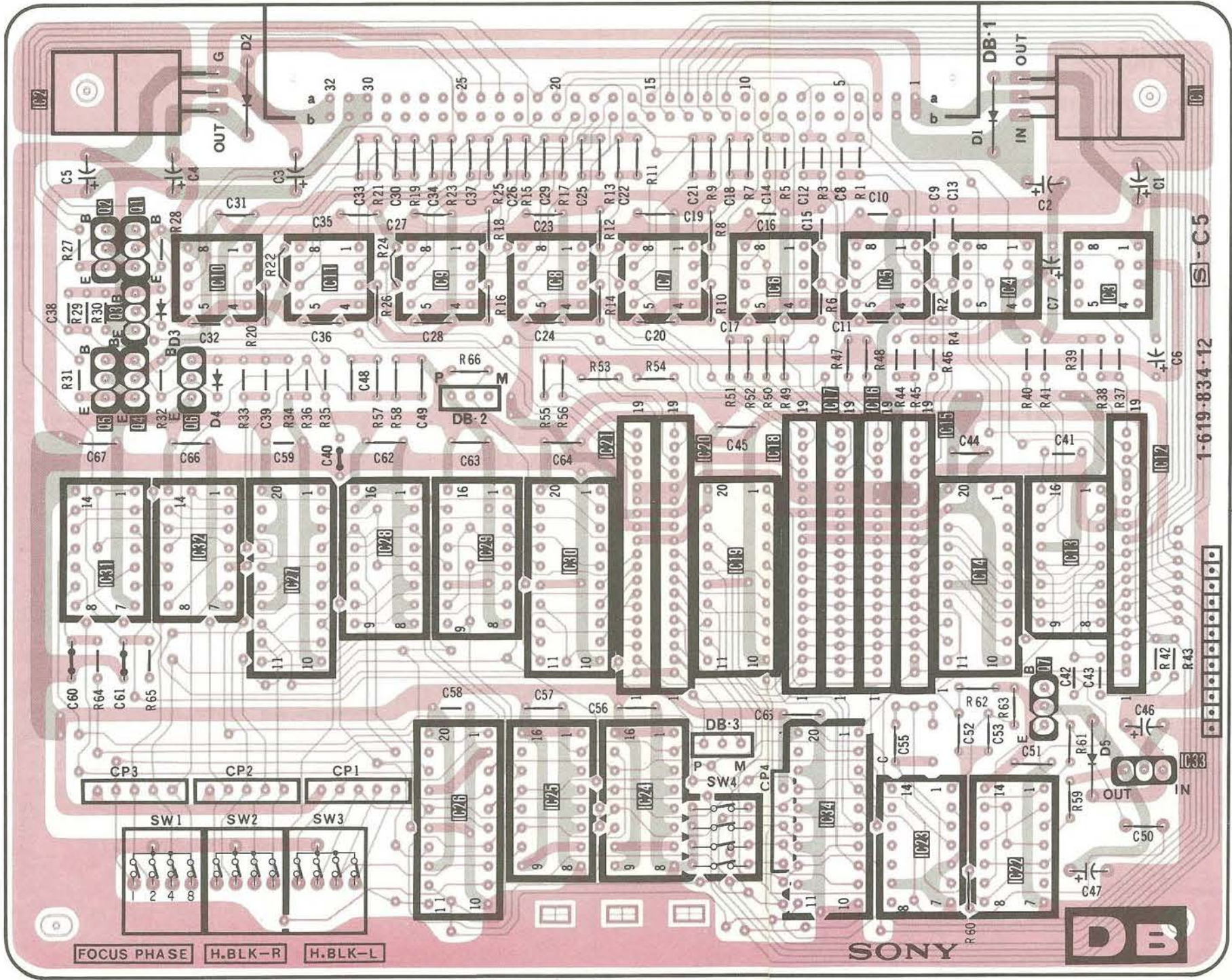


● : Conductor side pattern

● : Component side pattern

DB board (H. GENERATOR)

IC	2	10	11	28	9	29	8	30	21	7	20	19	18	17	16	23	14	22	3	33
Q																			7	
D		2																		5

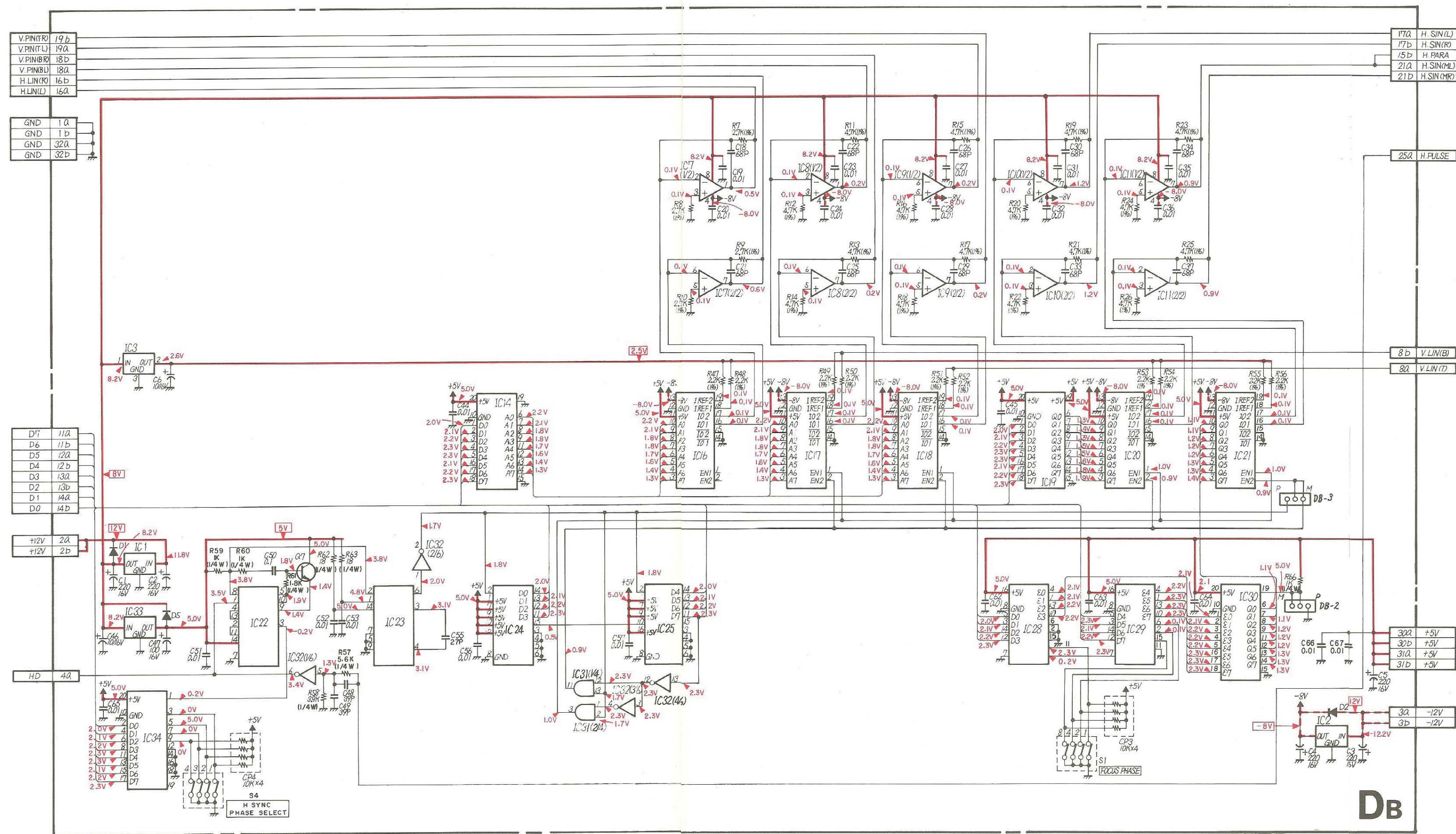


: Conductor side pattern

: Component side pattern

DB DB

DB board (H. GENERATOR)



5-81

5-82

DB

DB board

IC1	NJM78M08H	+8V REG
2	NJM79M08A	-8V REG
3	uPC1060C	+2.5V REG
7	TL082CP	H LIN (R & L) AMP
8	TL082CP	V PIN (B.L & B.R) AMP
9	TL082CP	V PIN (T.L & T.R) AMP
10	TL082CP	H SIN (R & L) AMP
11	TL082CP	H LIN (MR & ML) AMP
14	TBP28L42N	H PARA 1
16	CP2005S	V LIN (R & L) GEN
17	CP2005S	V PIN (B.L & B.R) GEN
18	CP2005S	V PIN (T.L & T.R) GEN
19	TBP28L42N	H SIN 1
20	CP2005S	H SIN (R & L) GEN
21	CP2005S	H SIN (MR & ML) GEN
22	MC4044P	PLL 1
23	MC4044P	PLL 2
24	SN74163N	H COUNTER 1
25	SN74163N	H COUNTER 2
28	SN74LS283N	H FOCUS PHASE 1
29	SN74LS285N	H FOCUS PHASE 2
30	TBP28L42N	H SIN 2
31	SN74LS08N	NAND
32	SN74LS04N	INV
33	uPC78L05	+5V REG
34	SN74LS682N	
Q7	2SC2603G	PLL BUFFER
D1	V19G	+8V REG PROT
2	V19G	-8V REG PROT
5	V19G	+5V REG PROT

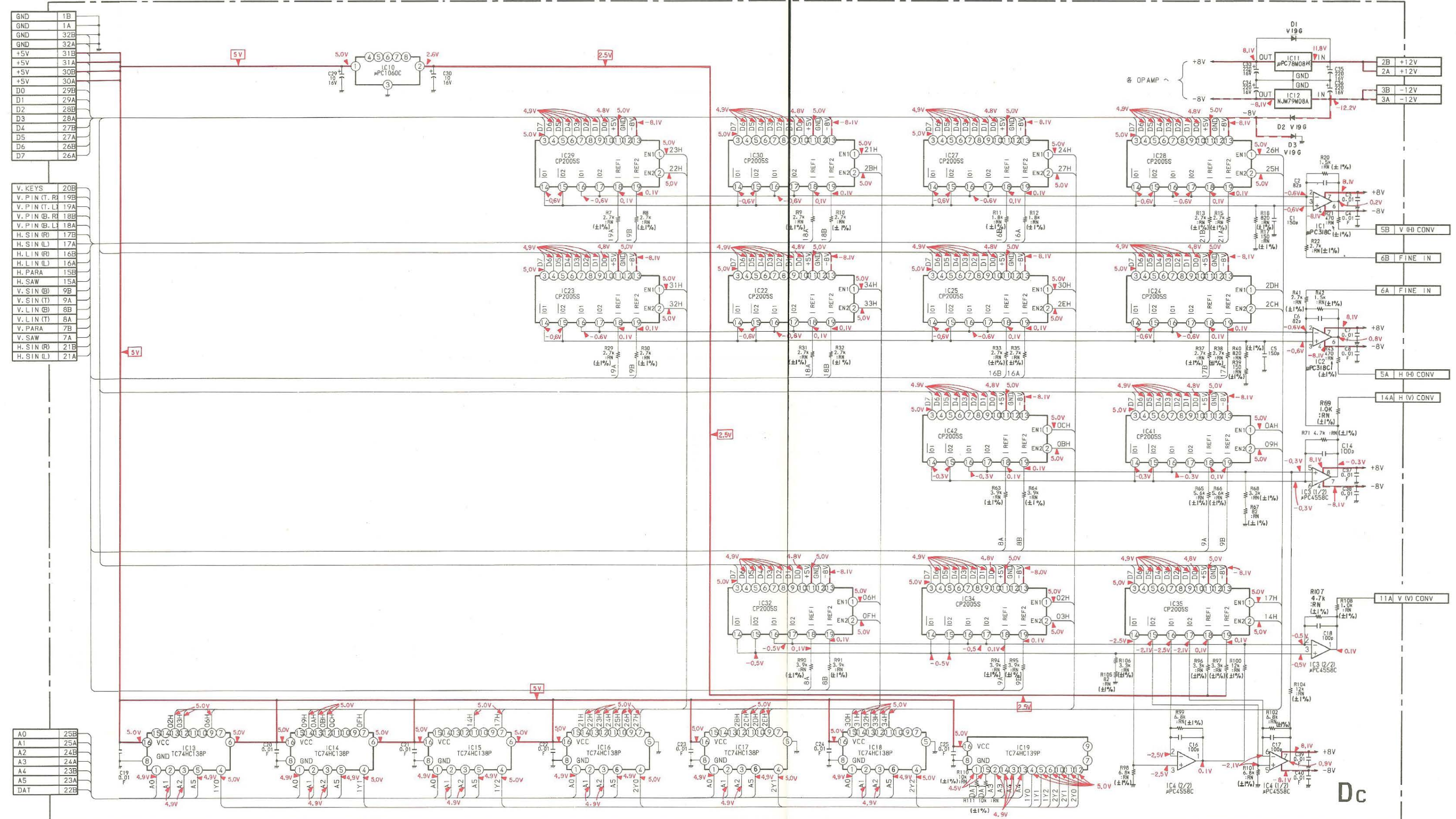
5-83

DC

DC board

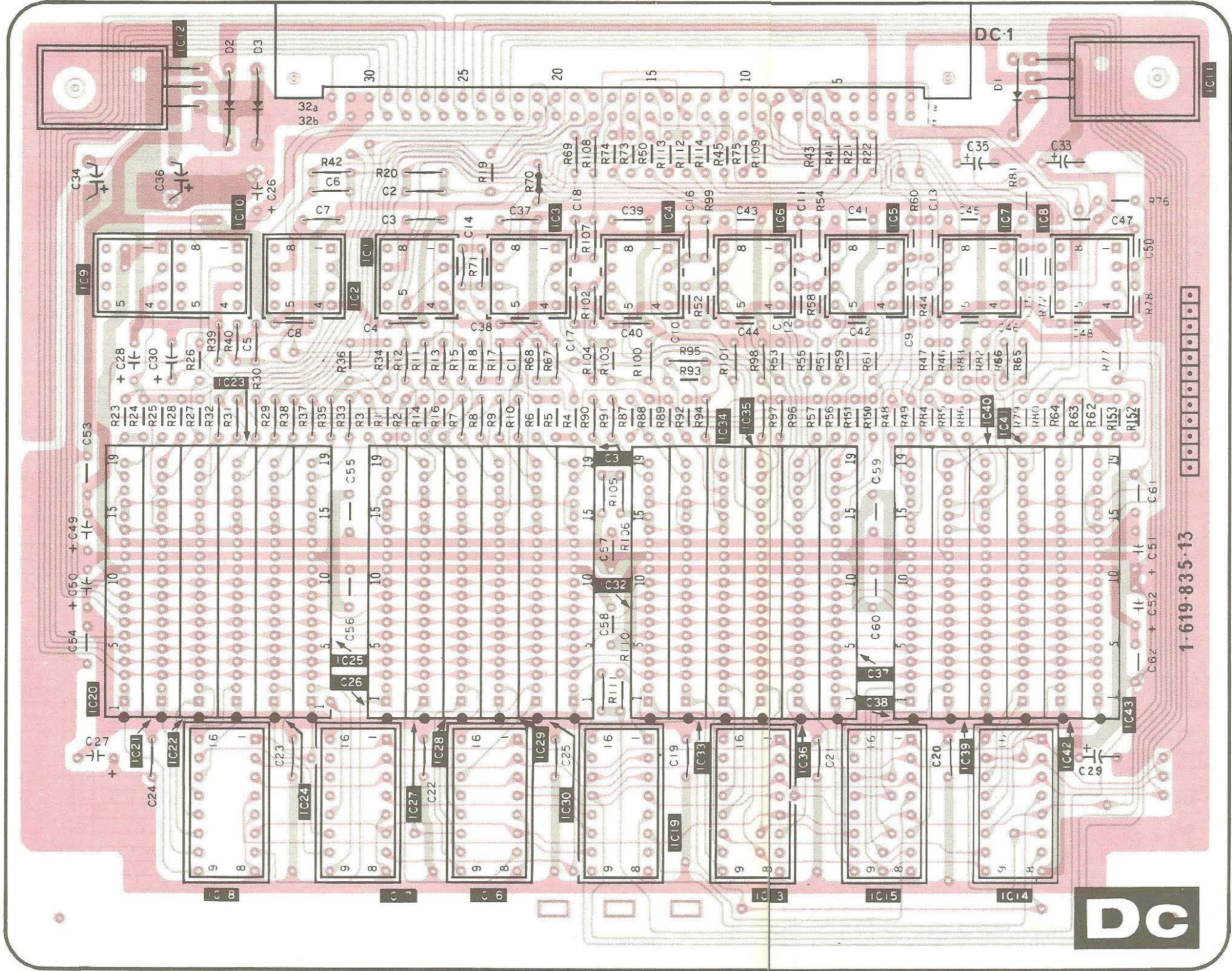
IC1	uPC318C	V (H) CONV AMP
2	uPC318C	H (H) CONV AMP
3	uPC4558C	H(V) CONV/V(V) CONV AMP
4	uPC4558C	H. STAT/V. STAT AMP
10	uPC1060C	+2.5V REG
11	NJM78M08H	+8V REG
12	NJM79M08A	-8V REG
13	TC74HC138P	ADD DECODER (1)
14	TC74HC138P	ADD DECODER (2)
15	TC74HC138P	ADD DECODER (3)
16	TC74HC138P	ADD DECODER (4)
17	TC74HC138P	ADD DECODER (5)
18	TC74HC138P	ADD DECODER (6)
19	TC74HC139P	ADD DECODER (7)
22	CP2005S	H CONV (B-S)
23	CP2005S	H CONV (T-S)
24	CP2005S	H CONV (M)
25	CP2005S	H CONV (S)
27	CP2005S	CONV (S)
28	CP2005S	CONV (T-M)
29	CP2005S	CONV (T-S)
30	CP2005S	CONV (B-S)
32	CP2005S	CONV (T & B)
34	CP2005S	CONV (M)
35	CP2005S	H/V STAT
41	CP2005S	CONV (C.M)
42	CP2005S	CONV (T & B)
D1	V19G	+8V REG PROT
2	V19G	-8V REG PROT 1
3	V19G	-8V REG PROT 2

DC board (DIGITAL GAIN CONTROL)



DC board (DIGITAL GAIN CONTROL)

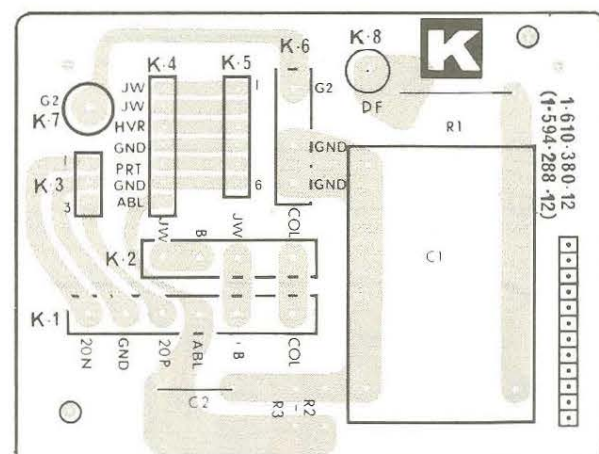
	12												11													
IC		22	10	23	24	2	25		1	27	28	29	3	30		4	32		34	35					41	42
			18				17					16				19				13		15		14		
D		2 3												1												



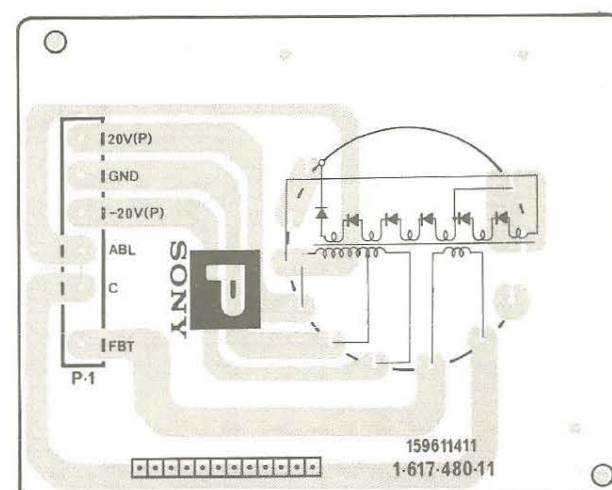
- : Conductor side pattern
- : Component side pattern

E, K, P, U

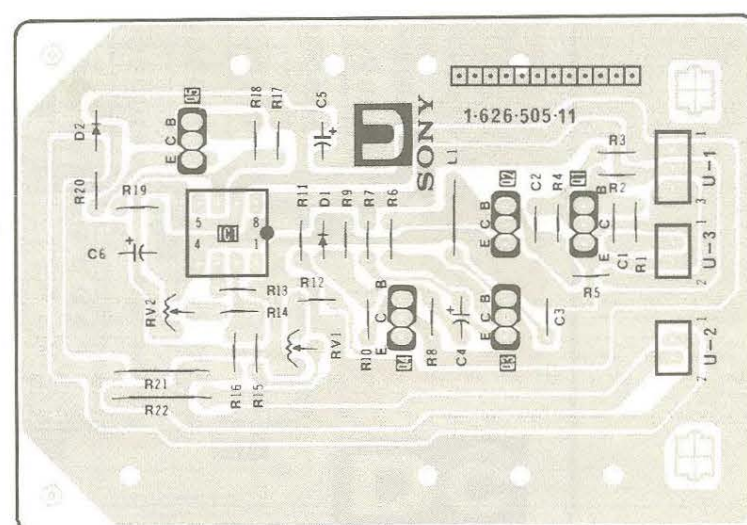
K board (DYNAMIC FOCUS, CONNECTOR RELAY)



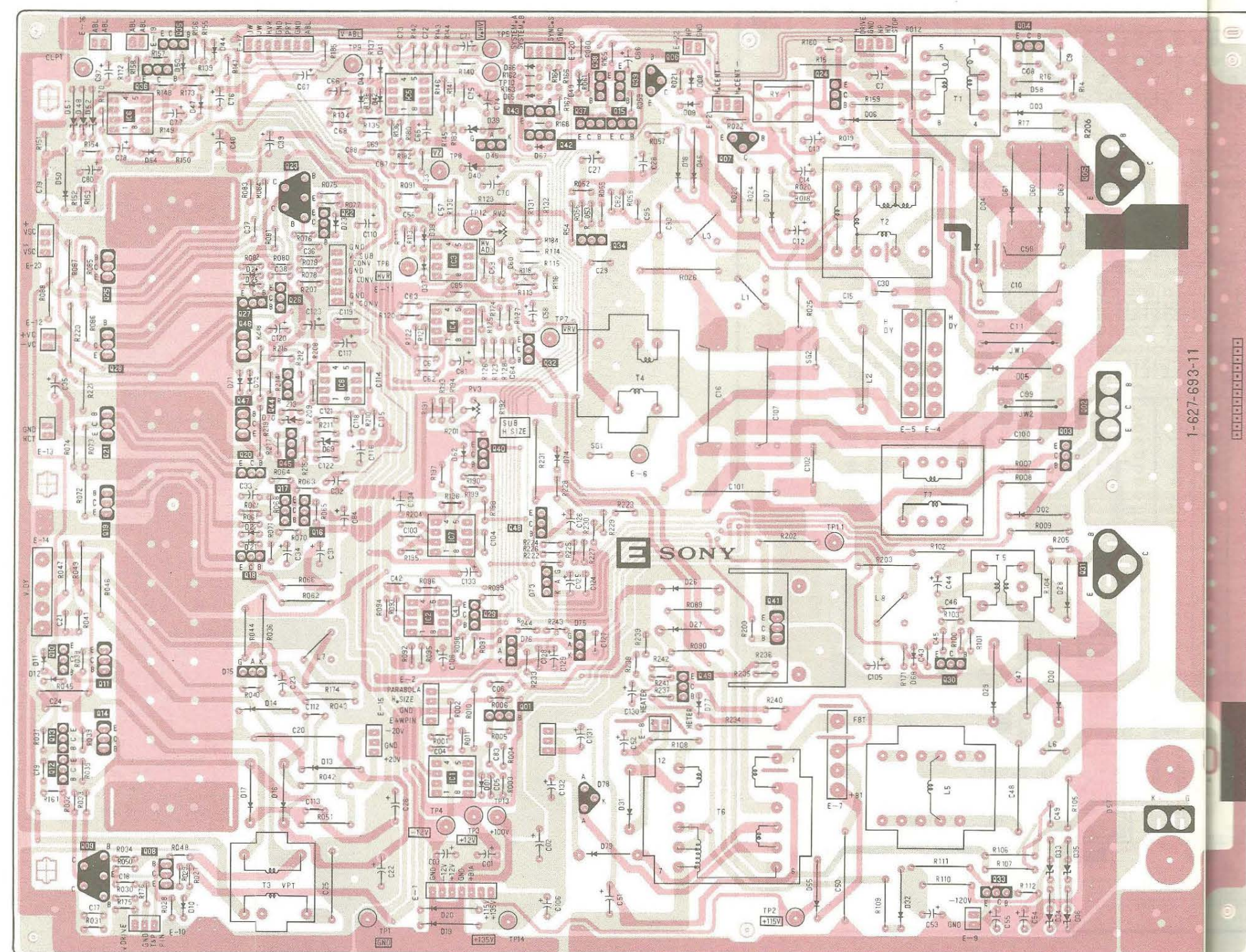
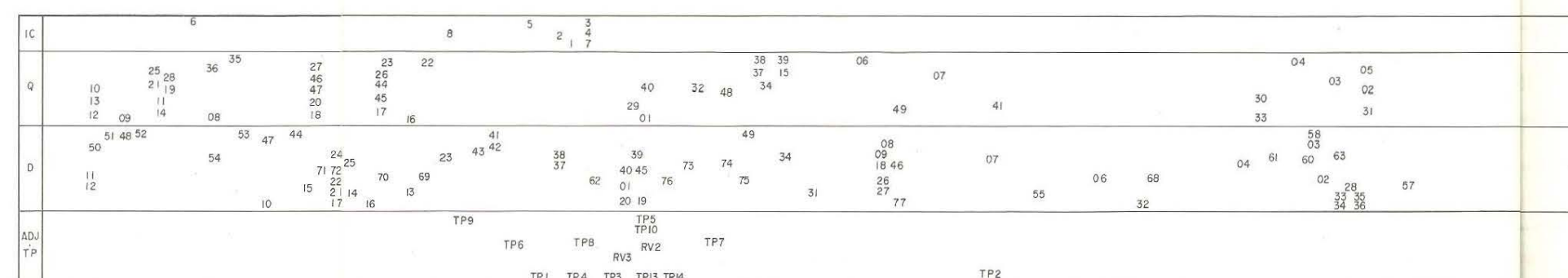
P board (EHT TRANSFORMER)



U Board (QUAD POLE MAGNET DRIVE)



E board (H/V DEFLECTION OUTPUT, DYNAMIC FOCUS, ENT REG)



E, K, P, U E, K, P, U

E board

1C1	uPC4558C	H PIN
2	NJM2903D	H DRIVE
3	uPC4558C	HV REG
4	NJM2903D	HV DRIVE
5	NJM2903D	HV PROTECT 1
6	NJM2903D	HV PROTECT 2
7	uPC4558C	SUB H PIN
01	2SC3209	H PIN DRIVE 1
2	2SC3263	H PIN OUT
3	2SC3209	H PIN DRIVE 2
4	2SD1138	H DRIVE 1
5	2SC3995	H DRIVE 2
6	2SD1137	H CENT 1
7	2SB860	H CENT 2
8	2SA1175	V AS
9	2SA979	V PREAMP
10	2SC1890A	V DRIVE 2
11	2SD1137	V OUT 1
12	2SC1890A	V DRIVE 1
13	2SA893A	V DRIVE 3
14	2SB860	V OUT 2
15	2SC2785	HP AMP 1
16	2SC2362K	HCT DRIVE 1
17	2SC2362K	HCT DRIVE 2
18	2SC1890A	HCT DRIVE 3
19	2SD669A	HCT OUT 1
20	2SA893A	HCT DRIVE 4
21	2SD669A	HCT OUT 2
22	2SD1175	V CY AS
23	2SA979	V CY PREAMP
24	2SD669A	V CY OUT 1
25	2SC1890A	V CY DRIVE 1
26	2SA893A	V CY DRIVE 2
27	2SD669A	V CY OUT 2
28	2SA1175	HV DRIVE 1
29	2SD789	HV DRIVE
30	2SC3387	HV OUT
31	2SB740	HV REG DRIVE
32	2SA1156	-120V REG
33	2SC3209	DF
34	2SC2785	ABL BUFF 2
35	2SD1175	ABL BUFF 1
36	2SC2785	HP AMP 2
37	2SC2785	HP OUT
38	2SA1175	HP SW
39	2SC2785	PIN DRIVE
40	2SC2335	SUB H PIN OUT
41	2SC3209	REG DRIVE
42	2SD1138	REG
43	2SC2785	RY DRIVE 1
44	2SC2785	RY DRIVE 2
45	2SD1137	
46	2SB860	
47	2SA1221	
48	2SA1221	
49	2SA1221	

D1	1SS119	H PIN PROT
2	RH-1A	H PIN PROT
3	RH-1A	H DRIVE
4	ERD28-08S	DUMP 3
5	ERD28-08S	SW 1
6	V19G	H CENT 1
7	V19G	H CENT 2
8	1SS119	BIAS 1
9	1SS119	BIAS 2
10	1SS119	BIAS 3
11	1SS119	BIAS 4
12	1SS119	BIAS 5
13	RH-1A	V SUPPLY
14	RH-1A	PROTECT
15	CRO2AM-8	Vcc SW
16	ERD31-04	+20V RECT
17	ERD31-04	-20V RECT
18	V19G	-20DV RECT
19	V19G	SW 1
20	V19G	SW 2
21	1SS119	BIAS 6
22	1SS119	BIAS 7
23	1SS119	BIAS 8
24	1SS119	BIAS 9
25	1SS119	BIAS 10
26	ERD31-04	+30V RECT
27	ERD31-04	-30V RECT
28	RH-1A	HV DRIVE
29	ERD28-08S	DUMP 1
30	ERD28-08S	DUMP 2
31	ERD31-04	HEATER REG
32	V11N	-120V REG
33	HZT33-02	30V REF 1
34	HZT33-02	30V REF 2
35	HZT33-02	30V REF 3
36	HZT33-02	30V REF 4
37	1SS119	HV PROT 1
38	1SS119	HV PROT 2
39	HZT33-02	HV PROTECT REF 1
40	HZT33-02	HV PROTECT REF 2
41	1SS119	ABL STOP 1
42	1SS119	ABL STOP 2
43	1SS119	HV STOP 1
44	1SS119	HV STOP 2
45	CRO2AM-8	HV PROT
46	V19G	H STOP 1
47	1SS119	BIAS 11
48	SG-2EL1	H REF
49	RH-1A	V STOP 1
50	RD10EL1	IK STOP
51	RD10EL1	V REF
52	1SS119	HV PROT 3
53	1SS119	H STOP OUT
54	SG-264A	HV REG
55	V19G	CLAMP
56	V19G	PROTECT
57	ERD28-08S	PIN 1
58	ERD28-08S	PIN 2
59	1SS119	CLAMP
60	ERD28-15S	DUMP 3
61	V19G	SHORT
62	1SS119	AND 1
63	1SS119	AND 2
64	1SS119	PROTECT
65	1SS119	BIAS 13
66	RD15ESB1	
67	RD15ESB1	
68	1SS119	
69	1SS119	
70	1SS119	
71	1SS119	
72	1SS119	
73	CRO2AM-4	
74	1SS119	
75	CRO2AM-4	
76	CRO2AM-4	
77	1SS119	

-  : Conductor side pattern
- : Component side pattern

E, K, P, U E, K, P, U

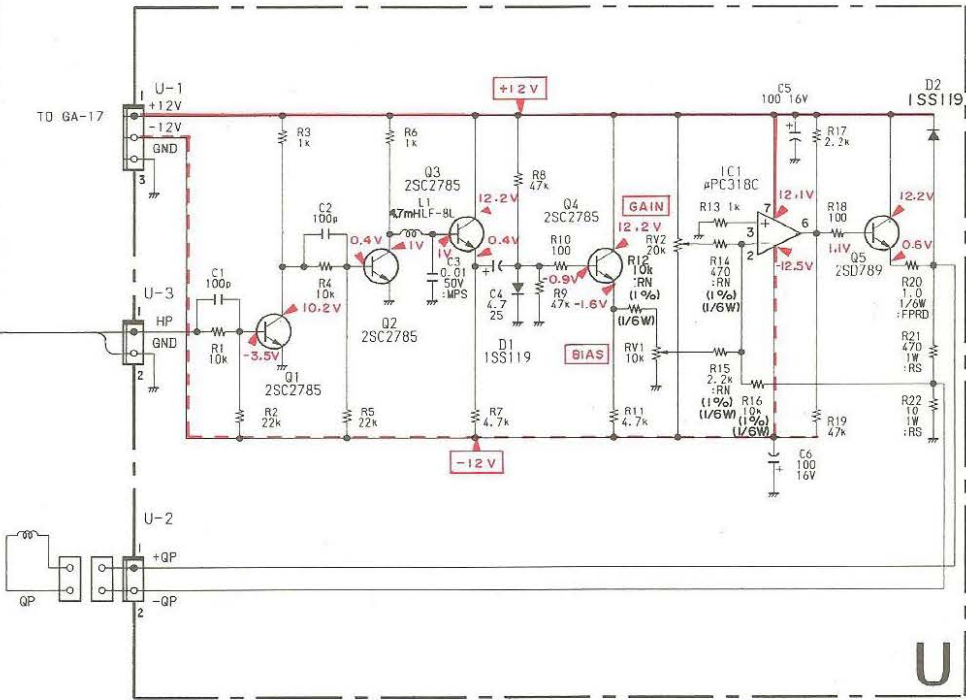
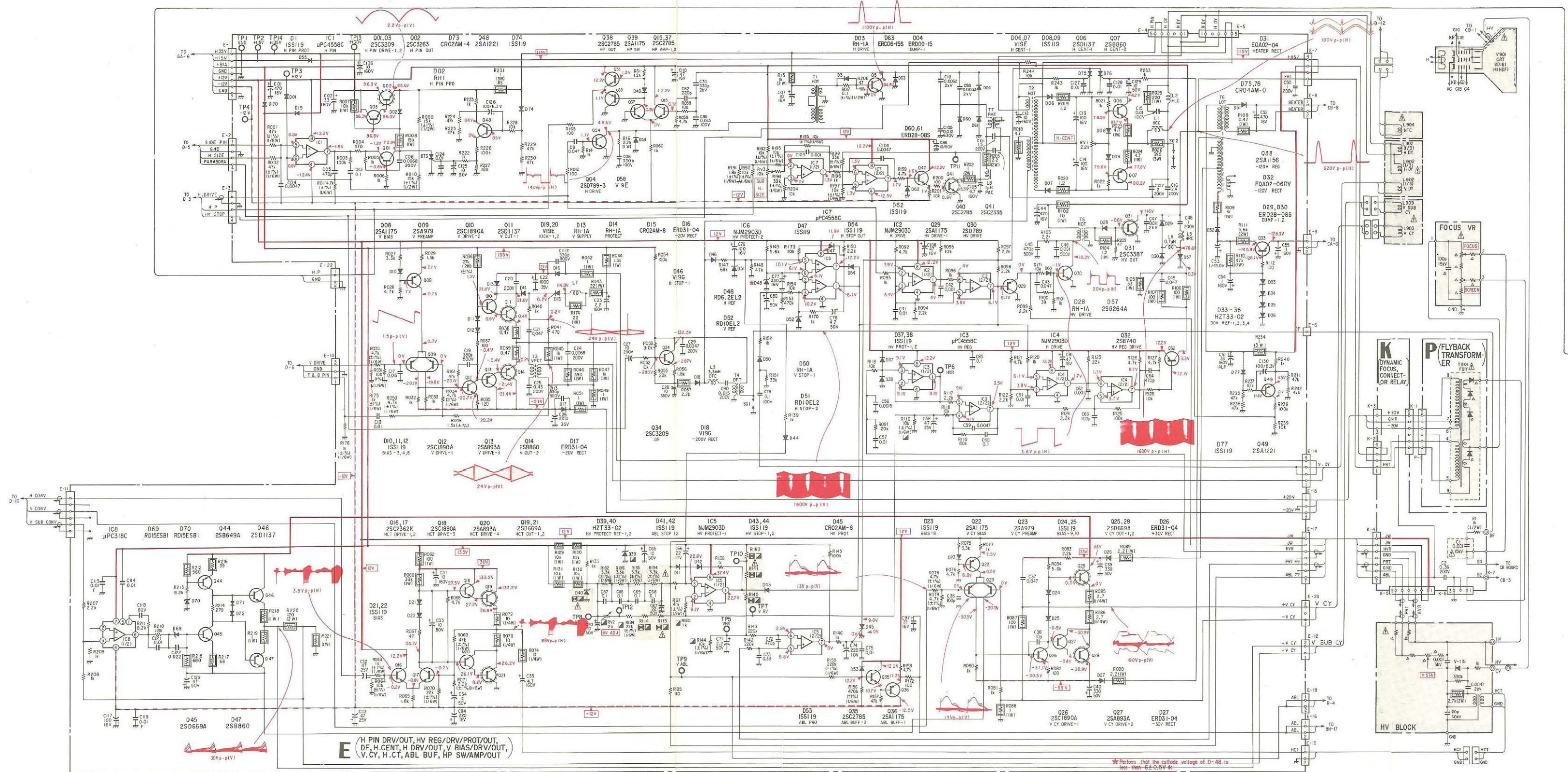
E, K, P, U

E board (H/V DEFLECTION OUTPUT, DYNAMIC FOCUS, ENT REG)

K board (DYNAMIC FOCUS, CONNECTOR RELAY)

P board (EHT TRANSFORMER)

U Board (QUAD POLE MAGNET DRIVE)



GA, F, JA, JB, Y

GA board

IC1	NJM7812B	+12V REG
2	UPC7912H	-12V REG
3	NJM7812B	+12V REG
4	UPC7912H	-12V REG
Q1	DTC124ES	DEGAUSS 1
2	DTC124ES	DEGAUSS 2
3	2SC3263	+BIAS REG
4	2SC3209	
D1	V19G	RECT 1
2	V19G	RECT 2
3	1SS119	PROTECT 1

F board

D1	CR3CM-8	OVP
2	RB406N	AC RECT

JA board

IC1	TC4053BP	SELECTOR
2	TC4053BP	SELECTOR
3	M54519P	SELECTOR
Q101	2SC2785	+10V REG
102	DTC124ES	DRIVE
103	DTC124ES	DRIVE
D101	TLY124	Y/Cw/Cb INDI
102	TLY124	RGB INDI
103	TLY124	CONTRAST INDI
104	TLY124	BRIGHT INDI
105	1SS119	
106	1SS119	
107	1SS119	
108	1SS119	
109	1SS119	

Y board

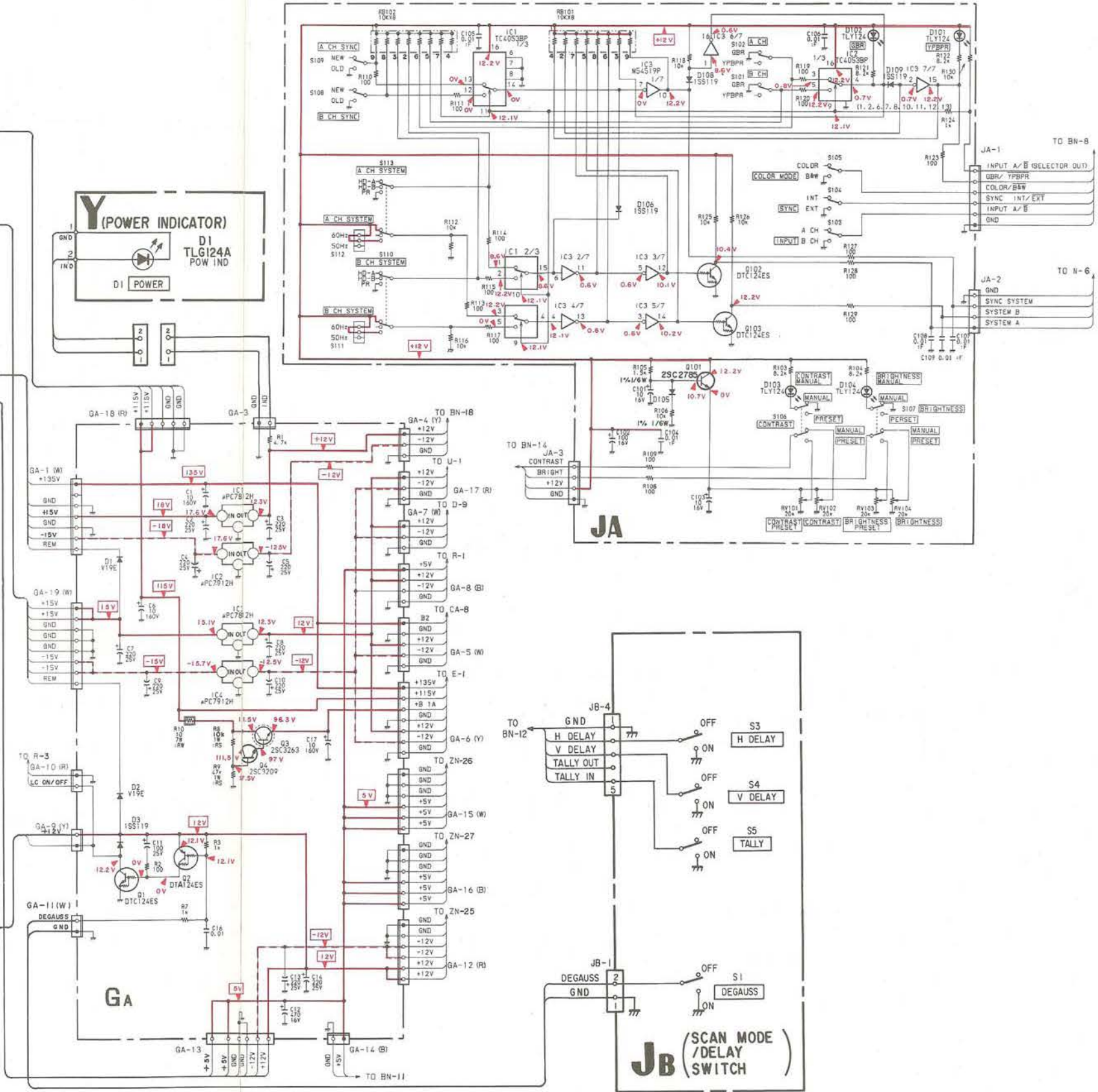
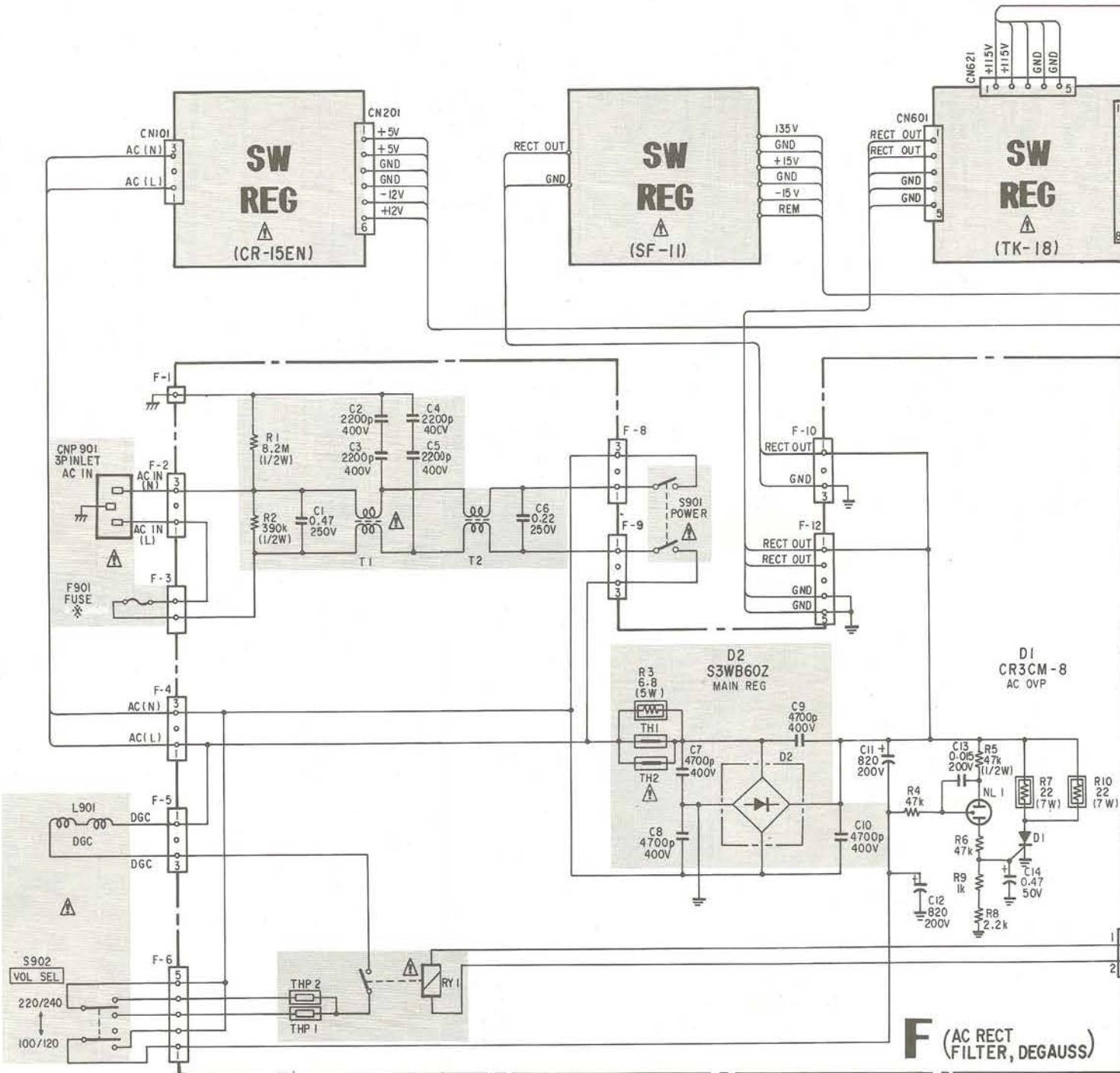
D1	TLG124A	POWER IND
----	---------	-----------

* NOTE

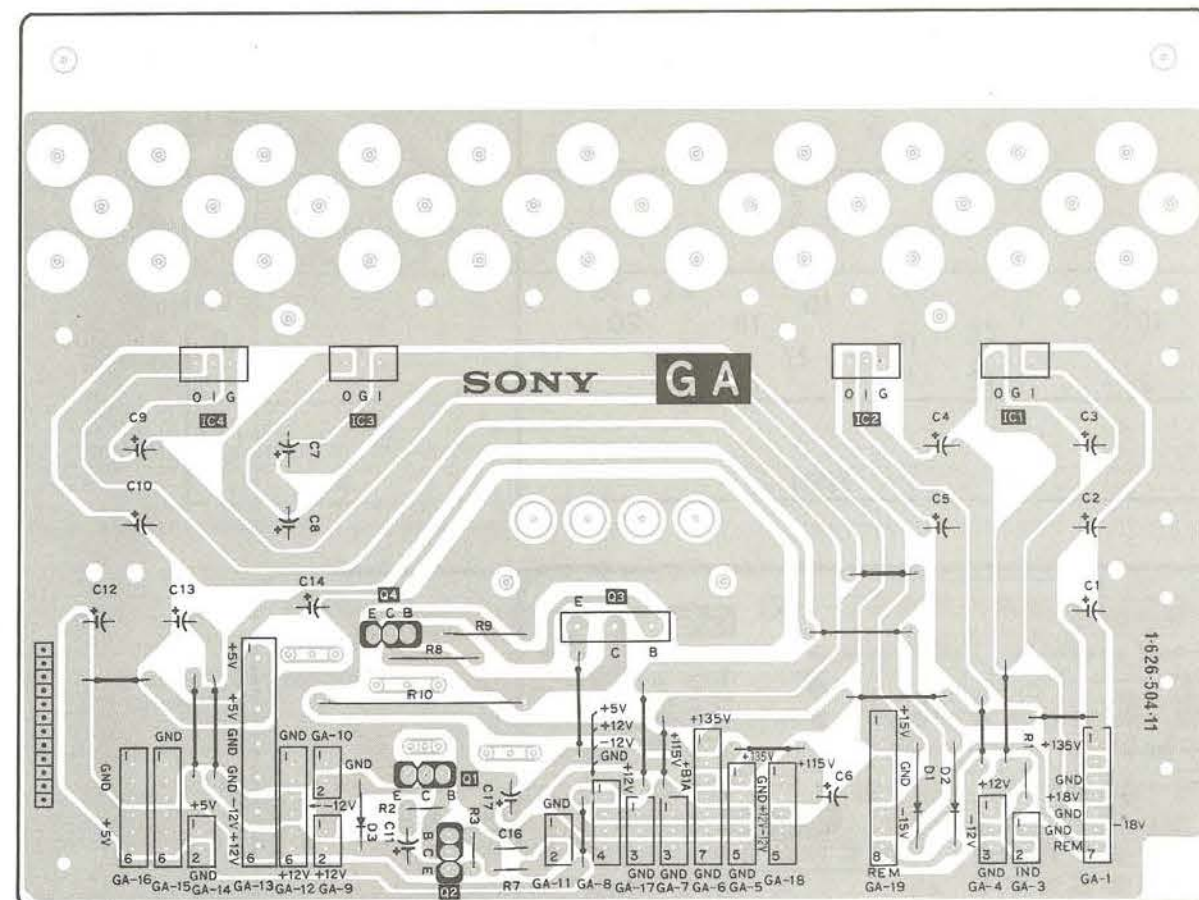
Ref	Model	HDM-3830	HDM-3830E
F901 (FUSE)		6.3A/125V	4A/250V

GA board (+12V/-12V REG, DEGAUSS) F board (LINE FILTER, AC SUPP SW, DEGAUSS)
JA board (SIGNAL SELECT CONTRAST/BRIGHTNESS VOLUMES) JB board (SCAN MODE/DELAY SWITCH) Y board (POWER INDICATOR)

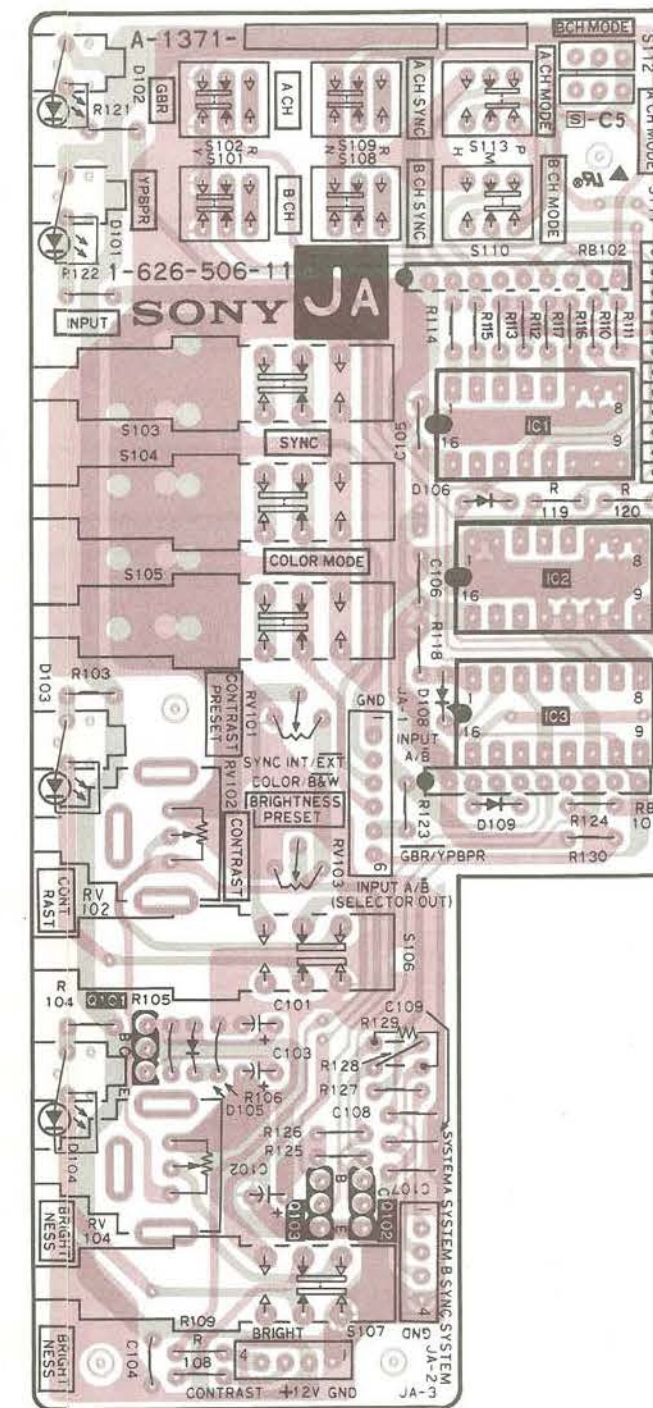
GA, F, JA, JB, Y GA, F, JA, JB, Y



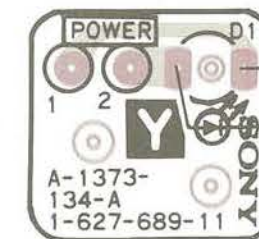
GA board (+12V/-12V REG, DEGAUSS)



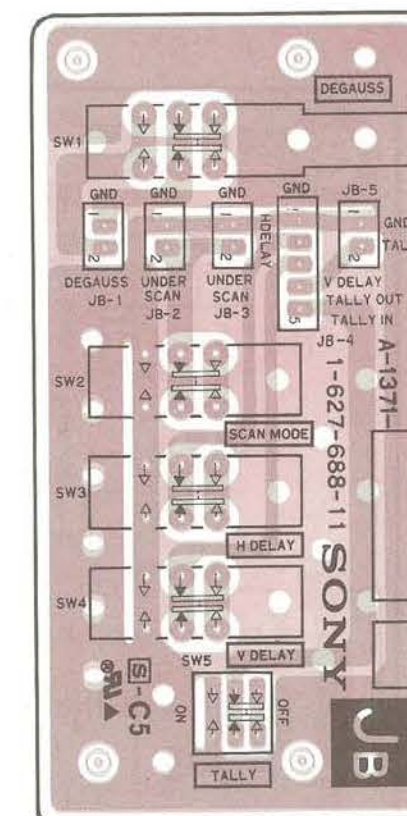
JA board (SIGNAL SELECT CONTRAST/ BRIGHTNESS VOLUMES)



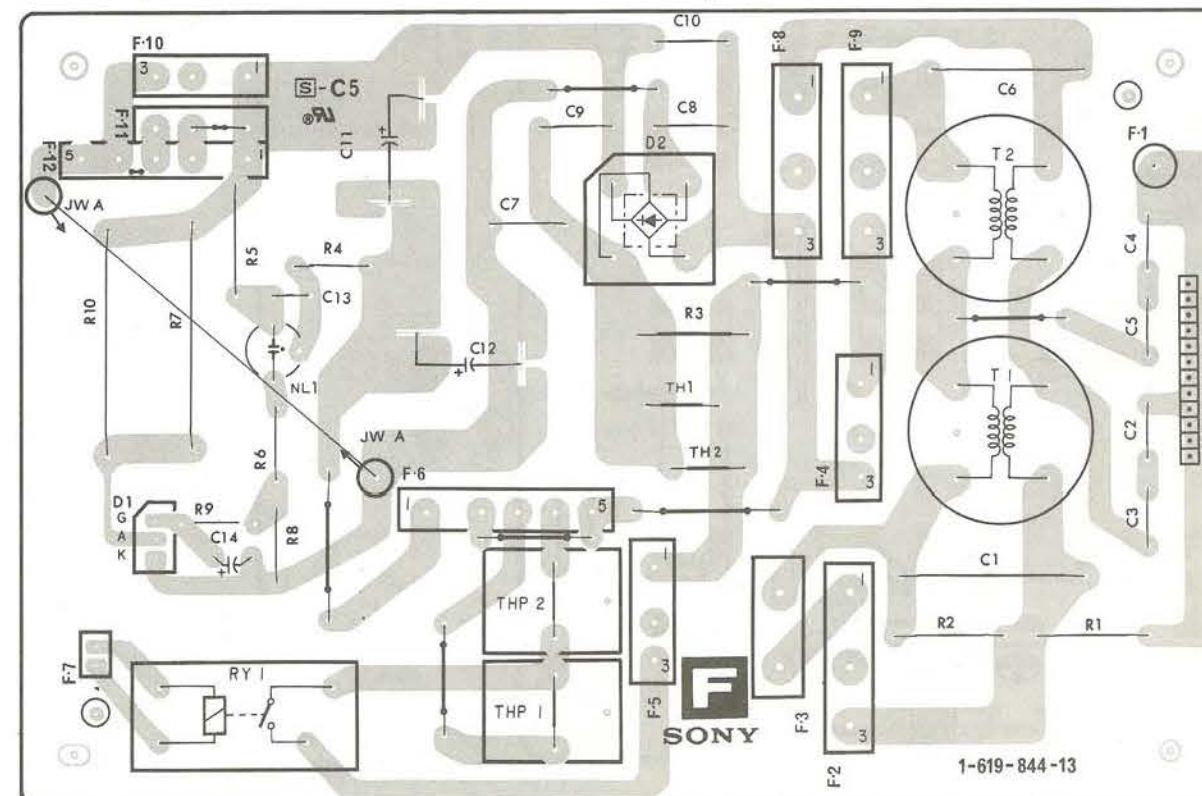
Y board (POWER INDICATOR)



JB board (SCAN MODE/DELAY SWITCH)

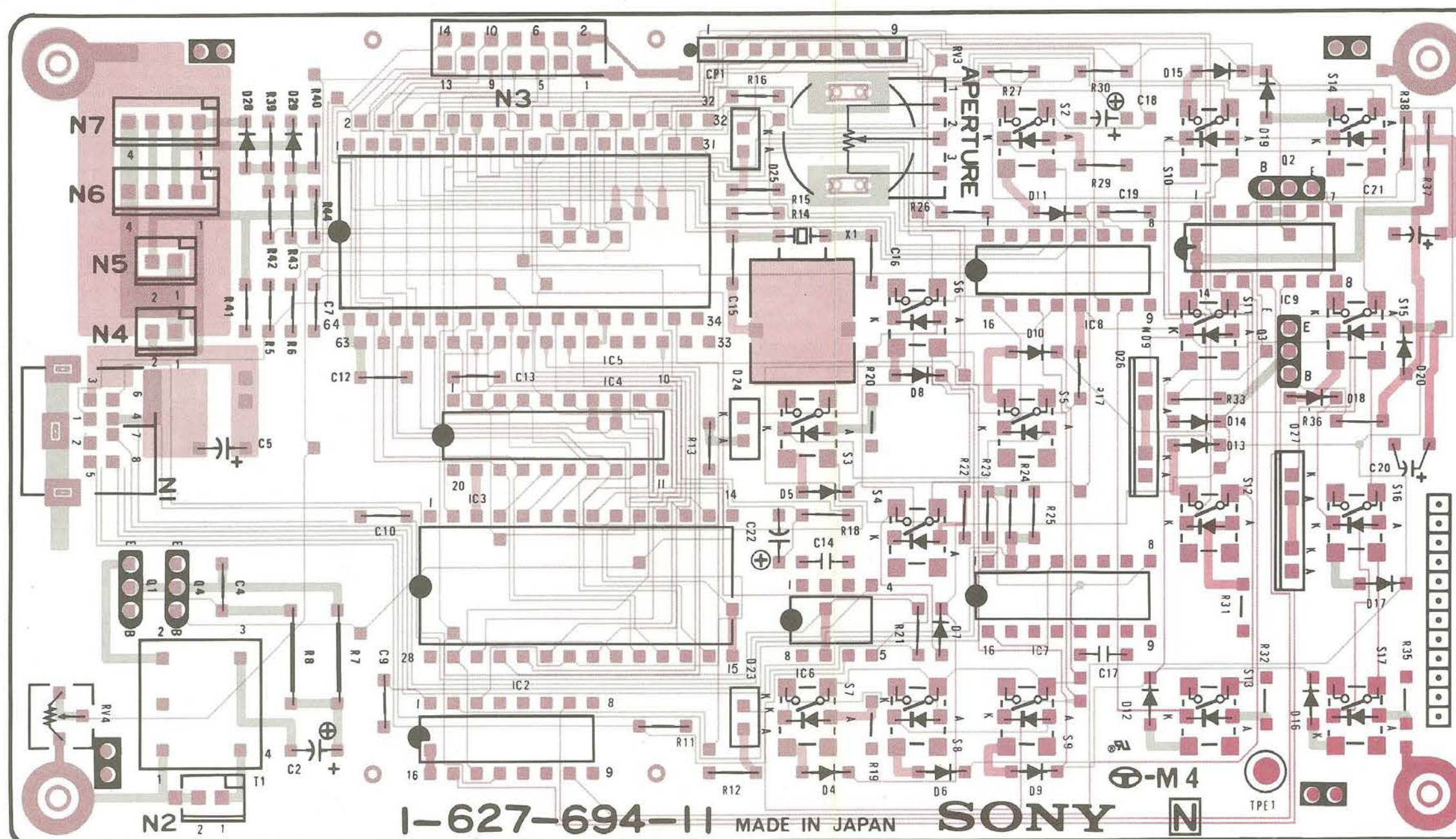


F board (LINE FILTER, AC SUPP SW, DEGAUSS)

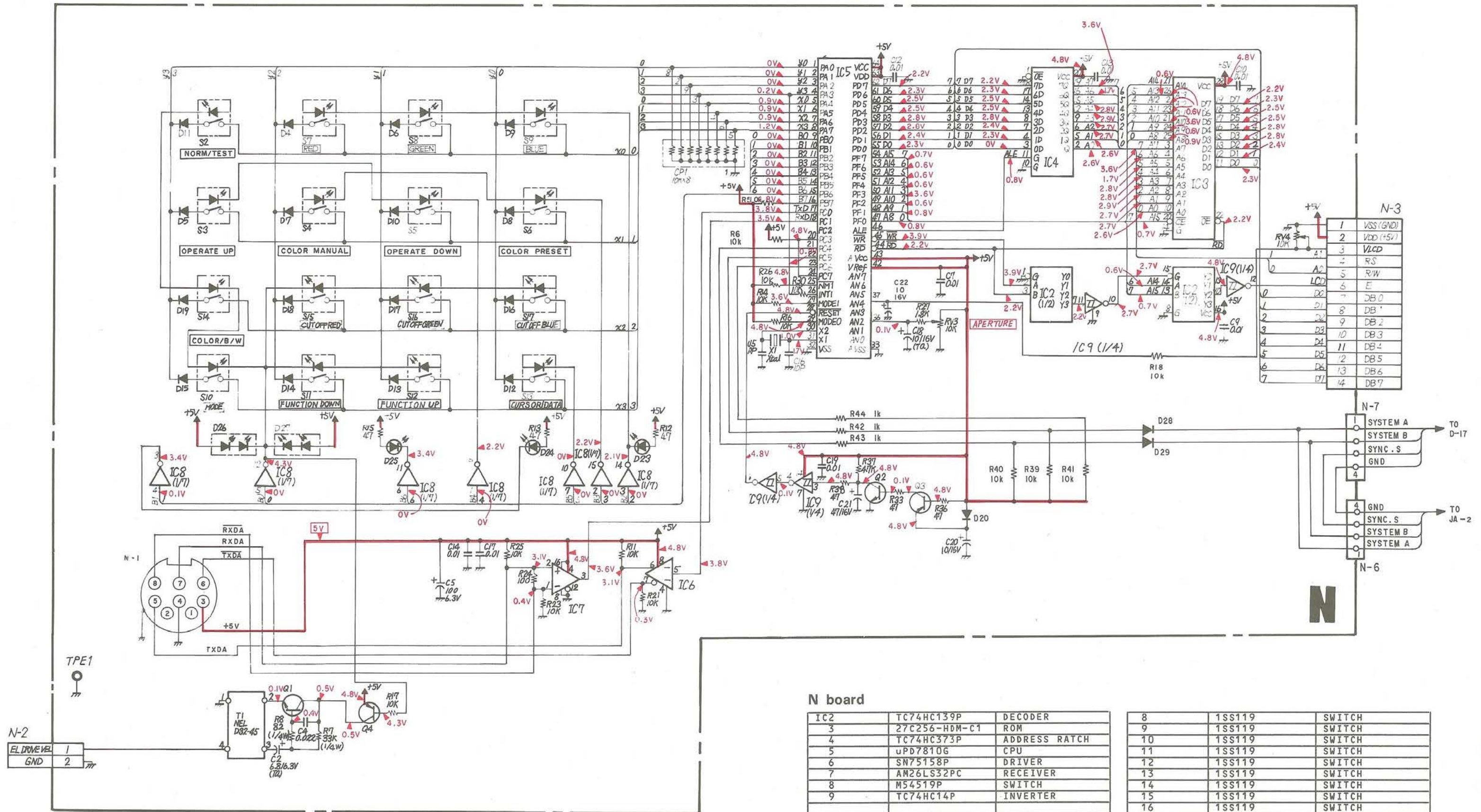


N board (CONTROL UNIT)

IC	5 4 3 2			6	7	8	9				
Q	1 4						2 3				
D	28 29			25 24 23	5 4	8 7 6	10 9	11 12	15 14 13	19 18 17 16	20
ADJ TP	RV4			RV3			TPE1				



N board (CONTROL UNIT)

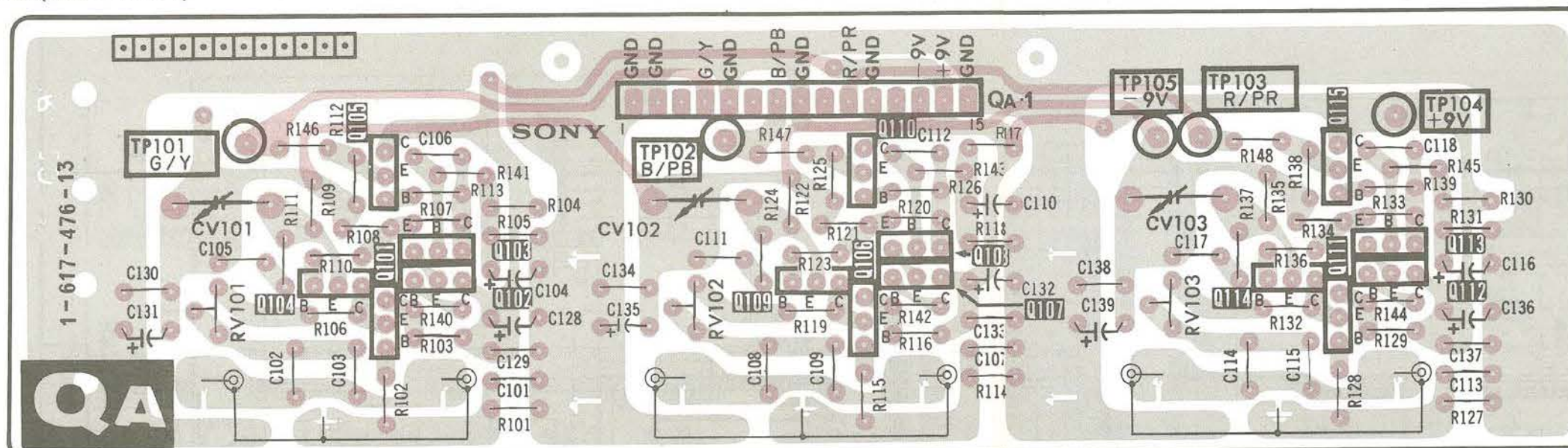


N board

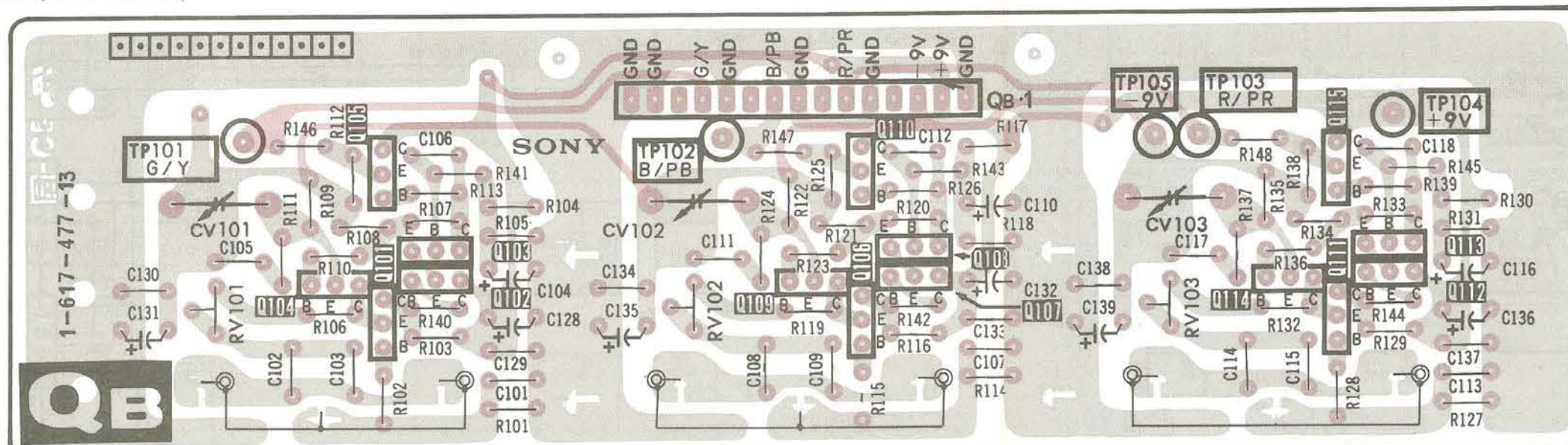
IC2	TC74HC139P	DECODER
3	27C256-HDM-C1	ROM
4	TC74HC373P	ADDRESS RATCH
5	uPD7810G	CPU
6	SN75158P	DRIVER
7	AM26LS32PC	RECEIVER
8	M54519P	SWITCH
9	TC74HC14P	INVERTER
Q1	2SC2785	SWITCH
2	2SC2785	BUFFER
3	2SA1048	SWITCH
4	2SA1048	BUFFER
D4	1SS119	SWITCH
5	1SS119	SWITCH
6	1SS119	SWITCH
7	1SS119	SWITCH

8	1SS119	SWITCH
9	1SS119	SWITCH
10	1SS119	SWITCH
11	1SS119	SWITCH
12	1SS119	SWITCH
13	1SS119	SWITCH
14	1SS119	SWITCH
15	1SS119	SWITCH
16	1SS119	SWITCH
17	1SS119	SWITCH
18	1SS119	SWITCH
19	1SS119	SWITCH
20	1SS119	SWITCH
23	SLP273B-01	LIGHT
24	SLP273B-01	LIGHT
25	SLP273B-01	LIGHT
26	SLP271E	LIGHT
27	SLP271E	LIGHT
28	1SS119	SWITCH
29	1SS119	SWITCH

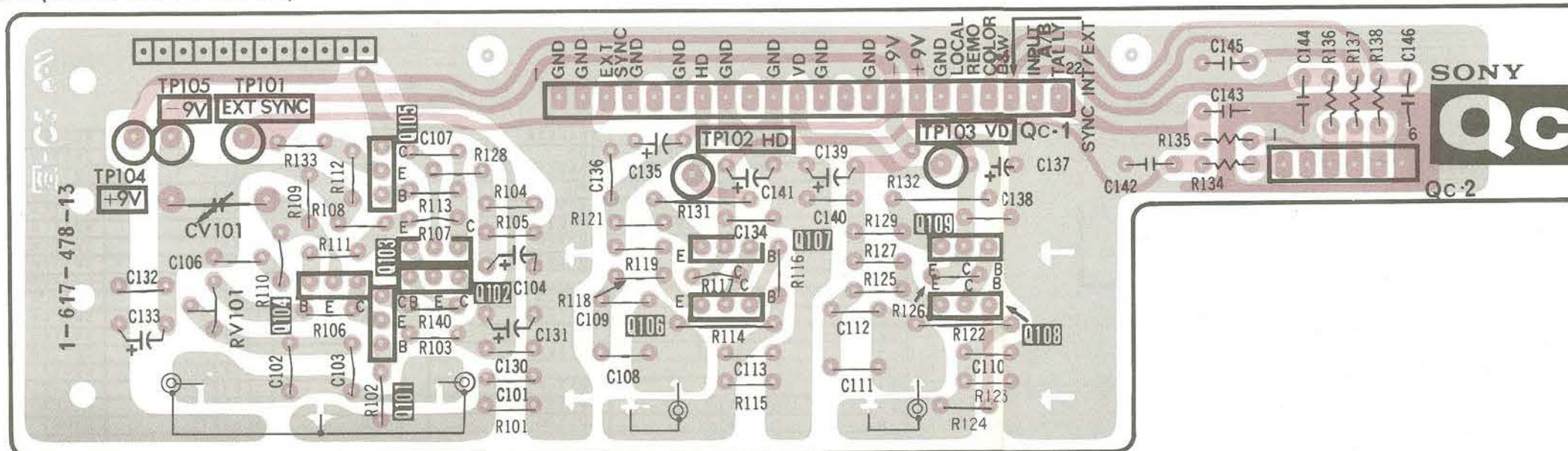
QA board (RGB INPUT)



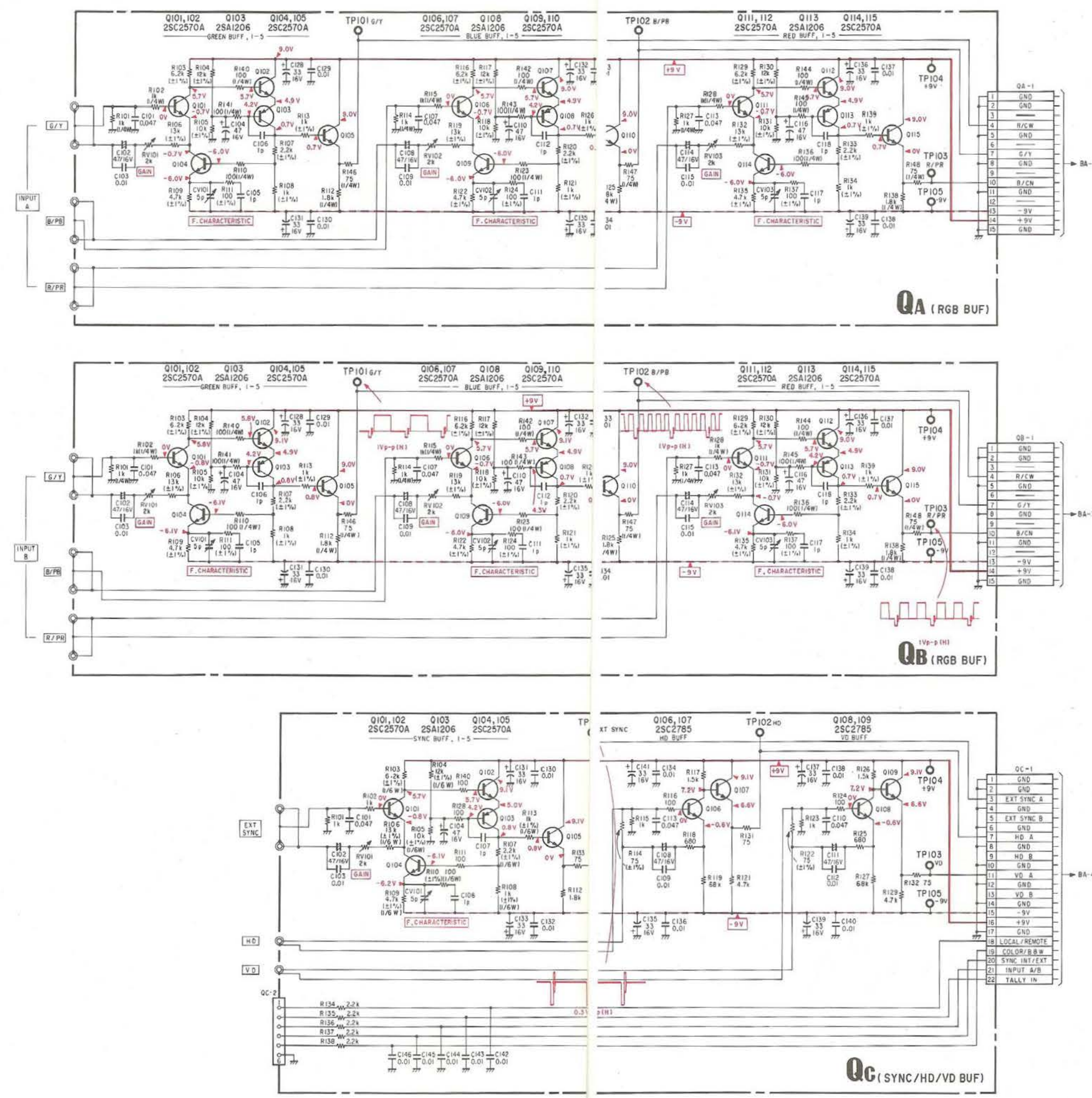
QB board (RGB INPUT)



QC board (SYNC/HD/VD INPUT)



QA, QB, QC QA, QB, QC
QA board (RGB INPUT) QB board (RGB INPUT) QC board (SYNC/HD/VD INPUT)



QA, QB, QC

QA board

Q101	2SC2570A	RED BUFF.1
102	2SC2570A	RED BUFF.2
103	2SA1206	RED BUFF.3
104	2SC2570A	RED BUFF.4
105	2SC2570A	RED BUFF.5
106	2SC2570A	GREEN BUFF.1
107	2SC2570A	GREEN BUFF.2
108	2SA1206	GREEN BUFF.3
109	2SC2570A	GREEN BUFF.4
110	2SC2570A	GREEN BUFF.5
111	2SC2570A	BLUE BUFF.1
112	2SC2570A	BLUE BUFF.2
113	2SA1206	BLUE BUFF.3
114	2SC2570A	BLUE BUFF.4
115	2SC2570A	BLUE BUFF.5

QB board

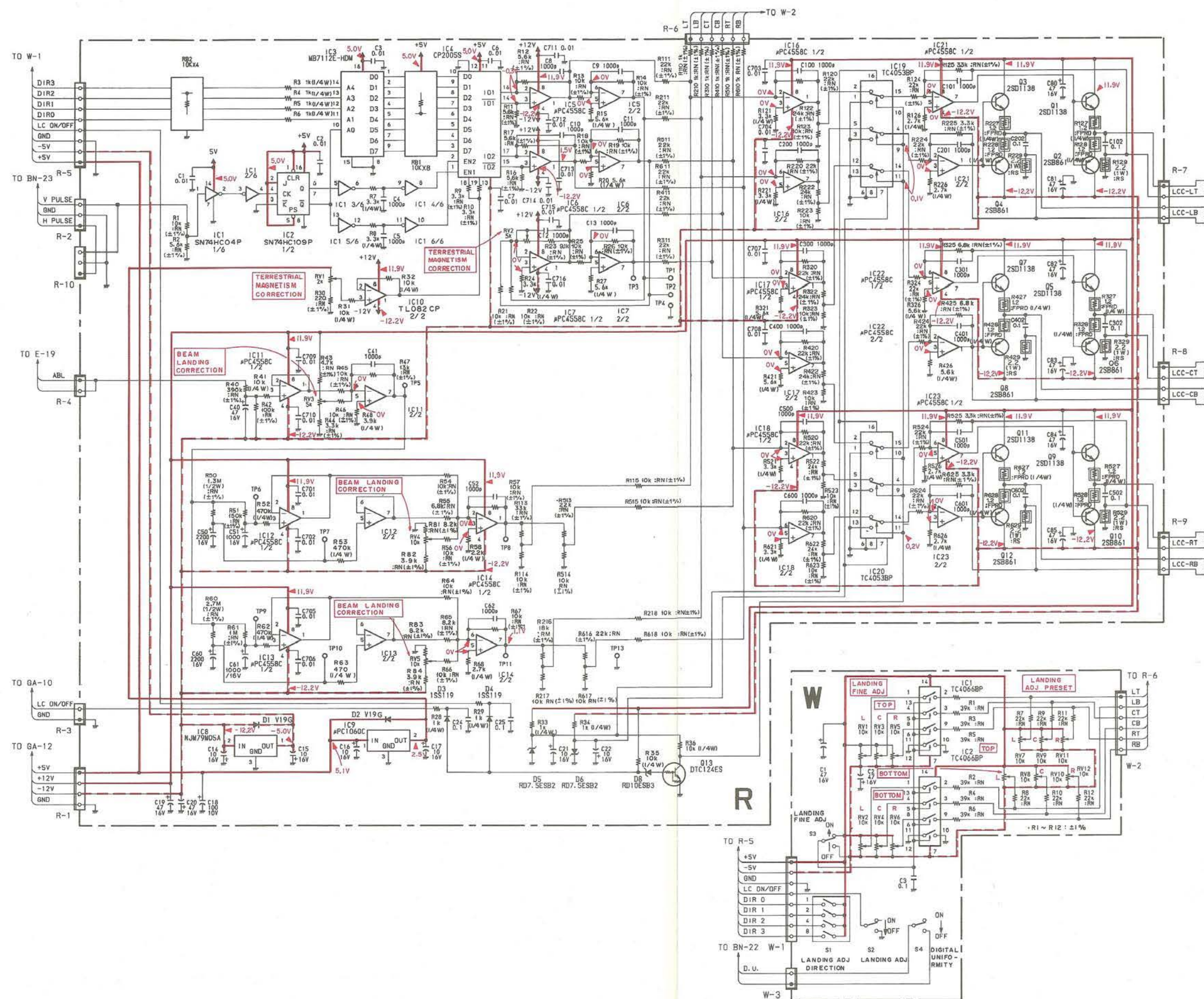
Q101	2SC2570A	RED BUFF.1
102	2SC2570A	RED BUFF.2
103	2SA1206	RED BUFF.3
104	2SC2570A	RED BUFF.4
105	2SC2570A	RED BUFF.5
106	2SC2570A	GREEN BUFF.1
107	2SC2570A	GREEN BUFF.2
108	2SA1206	GREEN BUFF.3
109	2SC2570A	GREEN BUFF.4
110	2SC2570A	GREEN BUFF.5
111	2SC2570A	BLUE BUFF.1
112	2SC2570A	BLUE BUFF.2
113	2SA1206	BLUE BUFF.3
114	2SC2570A	BLUE BUFF.4
115	2SC2570A	BLUE BUFF.5

QC board

Q101	2SC2570A	SYNC BUFF.1
102	2SC2570A	SYNC BUFF.2
103	2SA1206	SYNC BUFF.3
104	2SC2570A	SYNC BUFF.4
105	2SC2570A	SYNC BUFF.5
106	2SC2785	HD BUFF.1
107	2SC2785	HD BUFF.2
108	2SC2785	VD BUFF.1
109	2SC2785	VD BUFF.2

R, W R, W

R board (LANDING CORRECTION) W board (LANDING CONTROL)



R, W

R board

IC1	SN74HC04N	BUFFER
2	SN74HC109N	FLIP FLOP
3	MB7112E-HDM	DATA MEMORY
4	CP2005S	LATCH & D/A
5	UPC4558C	D/A BUFFER & INVERTER 1
6	UPC4558C	D/A BUFFER & INVERTER 2
7	UPC4558C	SUM & INVERTER
8	NJW7905A	-5V POWER SUPPLY
9	UPC1060C	D/A REF VOL
10	TL082CP	REF V BUFFER
11	UPC4558C	BUFFER & AMP 1
12	UPC4558C	BUFFER 1
13	UPC4558C	BUFFER 2
14	UPC4558C	SUM AMP 1
15	UPC4558C	BUFFER & AMP 2
16	UPC4558C	SUM AMP 2
17	UPC4558C	SUM AMP 3
18	UPC4558C	SUM AMP 4
19	TC4053BP	SWITCH 1
20	TC4053BP	SWITCH 2
21	UPC4558C	OUTPUT STAGE DRIVE 1
22	UPC4558C	OUTPUT STAGE DRIVE 2
23	UPC4558C	OUTPUT STAGE DRIVE 3
Q1	2SD1138	LCC DRIVE OUT 1
2	2SB861	LCC DRIVE OUT 1
3	2SD1138	LCC DRIVE OUT 2
4	2SB861	LCC DRIVE OUT 2
5	2SD1138	LCC DRIVE OUT 3
6	2SB861	LCC DRIVE OUT 3
7	2SD1138	LCC DRIVE OUT 4
8	2SB861	LCC DRIVE OUT 4
9	2SD1138	LCC DRIVE OUT 5
10	2SB861	LCC DRIVE OUT 5
11	2SD1138	LCC DRIVE OUT 6
12	2SB861	LCC DRIVE OUT 6
13	DTC124ES	OUTPUT CONTROLE
D1	V196	PROTECT 1
2	V196	PROTECT 2
3	1SS119	SW1
4	1SS119	SW2
5	RD7.5ESB2	7.5V REG
6	RD7.5ESB2	-7.5V REG
7	1SS119	TEMP SENSER

W board

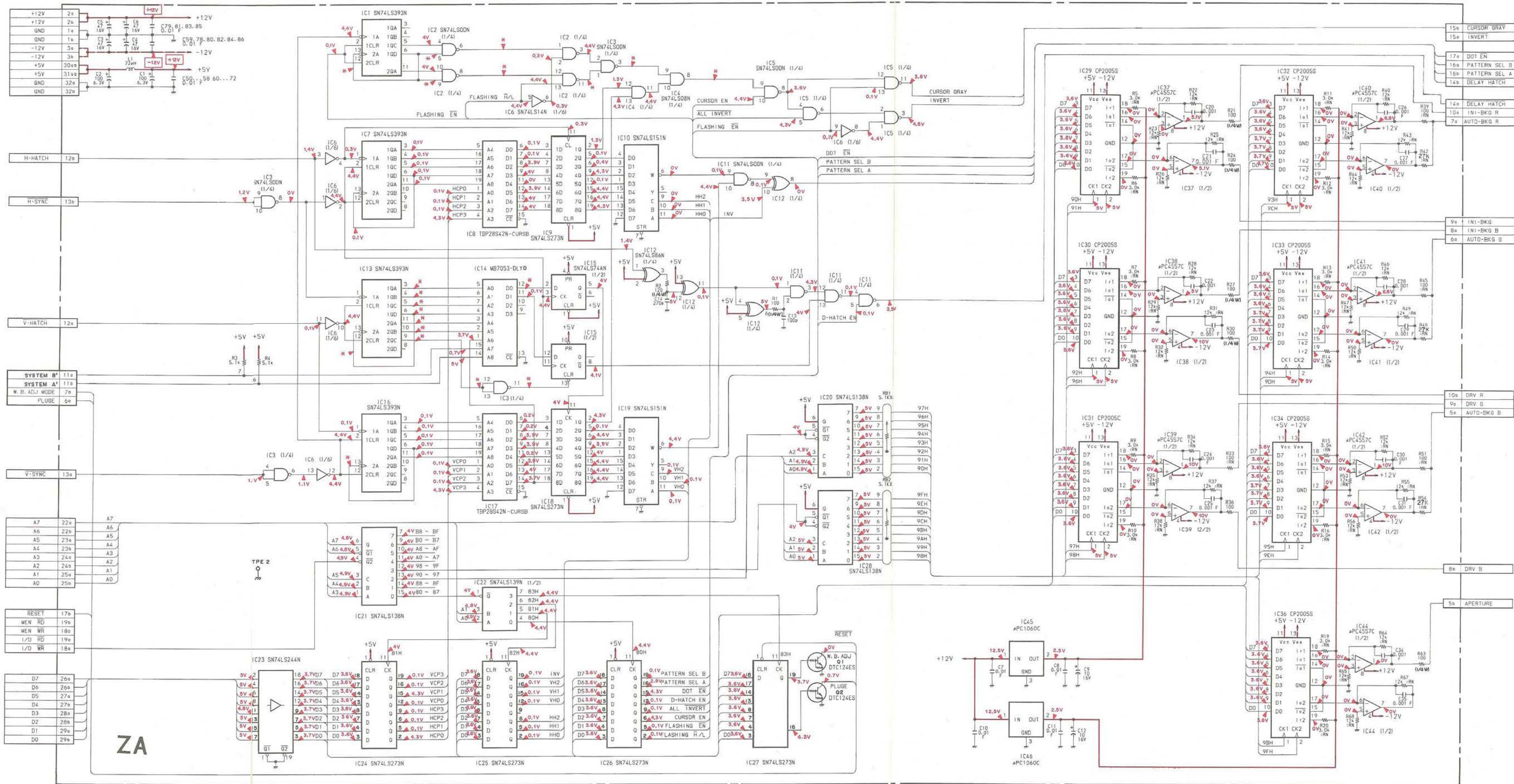
IC1	TC4066BP	SWITCH 1
2	TC4066BP	SWITCH 2

ZA

ZA board

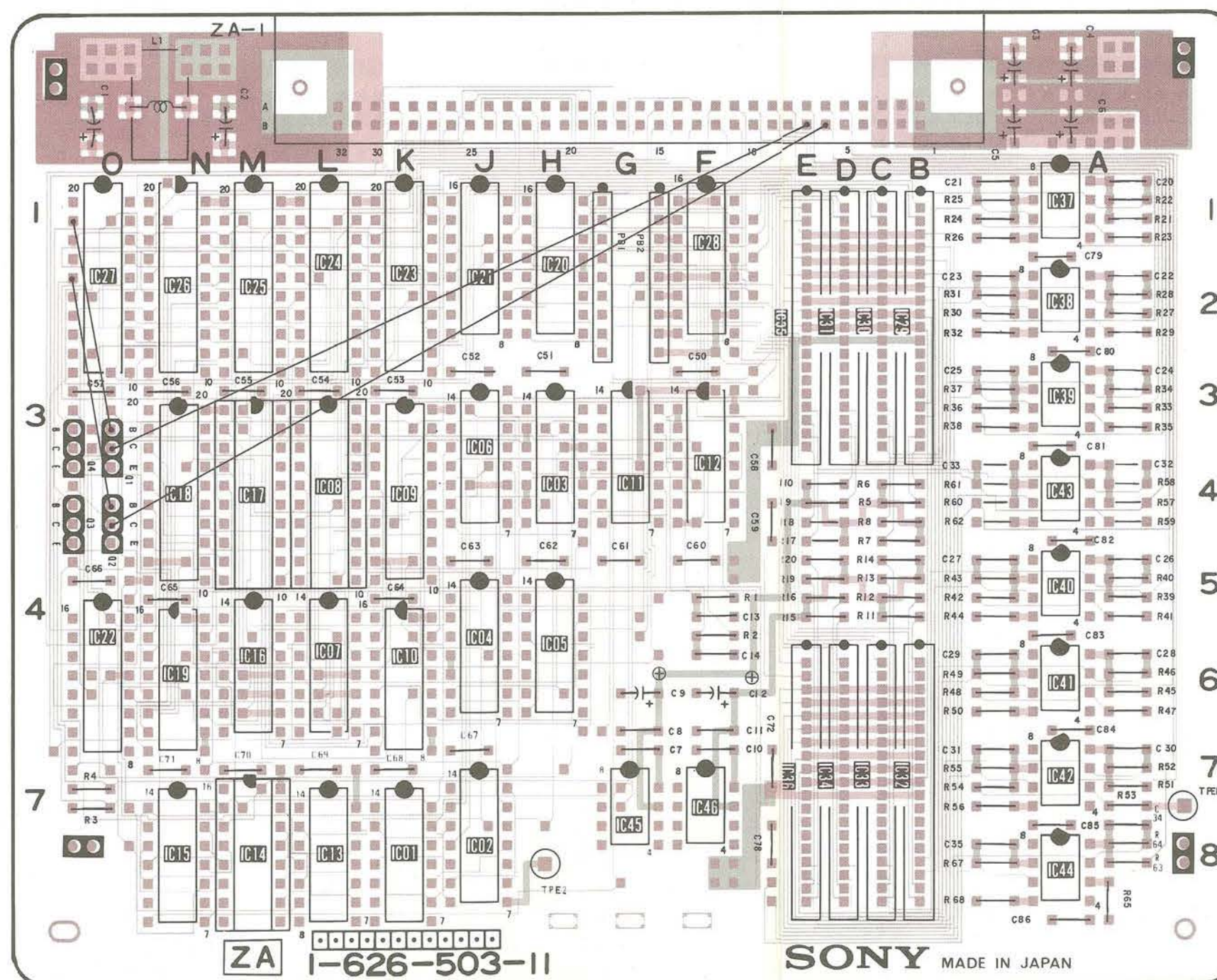
IC1	SN74LS393N	COUNTER
2	SN74LS00N	GATE
3	SN74LS00N	GATE
4	SN74LS08N	
5	SN74LS00N	GATE
6	SN74LS14N	
7	SN74LS393N	COUNTER
8	TBP28L42N-CURSB	TIMING GEN
9	SN74LS273N	LATCH
10	SN74LS151N	SELECTOR
11	SN74LS00N	GATE
12	SN74LS86N	D/A
13	SN74LS393N	COUNTER
14	MB7053-DLYC	V DELAY
15	SN74LS74N	LATCH
16	SN74LS393N	COUNTER
17	TBP28L42N-CURSB	TIMING GEN
18	SN74LS273N	LATCH
19	SN74LS151N	SELECTOR
20	SN74LS138N	ADRS ENCODE 1
21	SN74LS138N	ADRS ENCODE 2
22	SN74LS139N	ADRS ENCODE 3
23	SN74LS244N	BUFFER
24	SN74LS273N	LATCH
25	SN74LS273N	LATCH
26	SN74LS273N	LATCH
27	SN74LS273N	LATCH
28	SN7406N	BUFFER
29	CP2005S	D/A
30	CP2005S	D/A
31	CP2005S	D/A
32	CP2005S	D/A
33	CP2005S	D/A
34	CP2005S	D/A
35	CP2005S	BUFFER
36	CP2005S	BUFFER
37	uPC4557C	BUFFER
38	uPC4557C	BUFFER
39	uPC4557C	BUFFER
40	uPC4557C	BUFFER
41	uPC4557C	VOLTAGE REF
42	uPC4557C	BUFFER
43	uPC4557C	BUFFER
44	uPC4557C	BUFFER
45	uPC1060C	VOLTAGE REF
46	uPC1060C	VOLTAGE REF
Q1	DTC124ES	
2	DTC124ES	
3	DTC124ES	

ZA board (CURSOR GEN, SG CONTROL, V-BALANCE, APERTURE CONTROL)



ZA	ZA
----	----

ZA board (CURSOR GEN, SG CONTROL, W-BALANCE, APERTURE CONTROL)

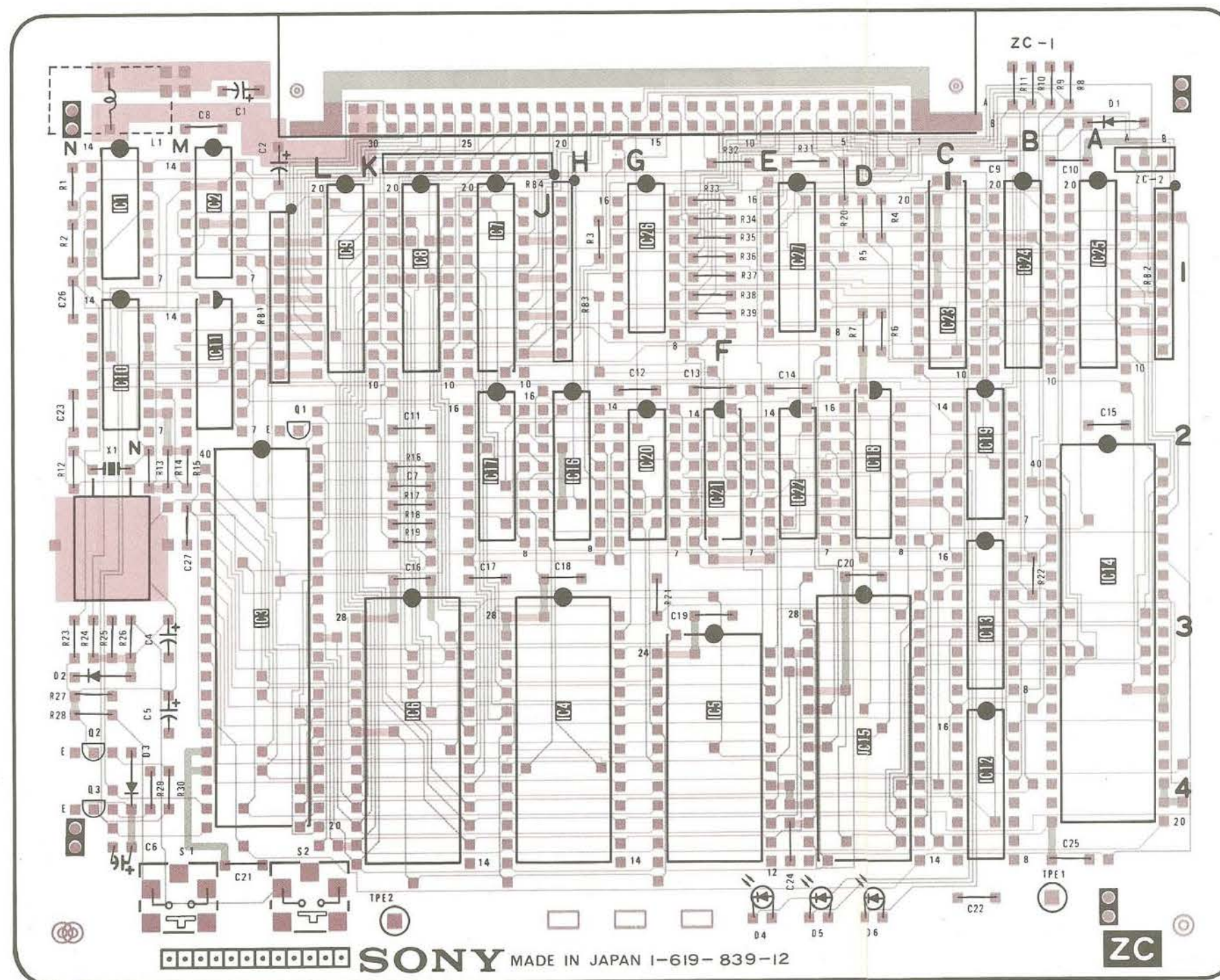
[illegible]

- : Conductor side pattern
- : Component side pattern

ZC ZC

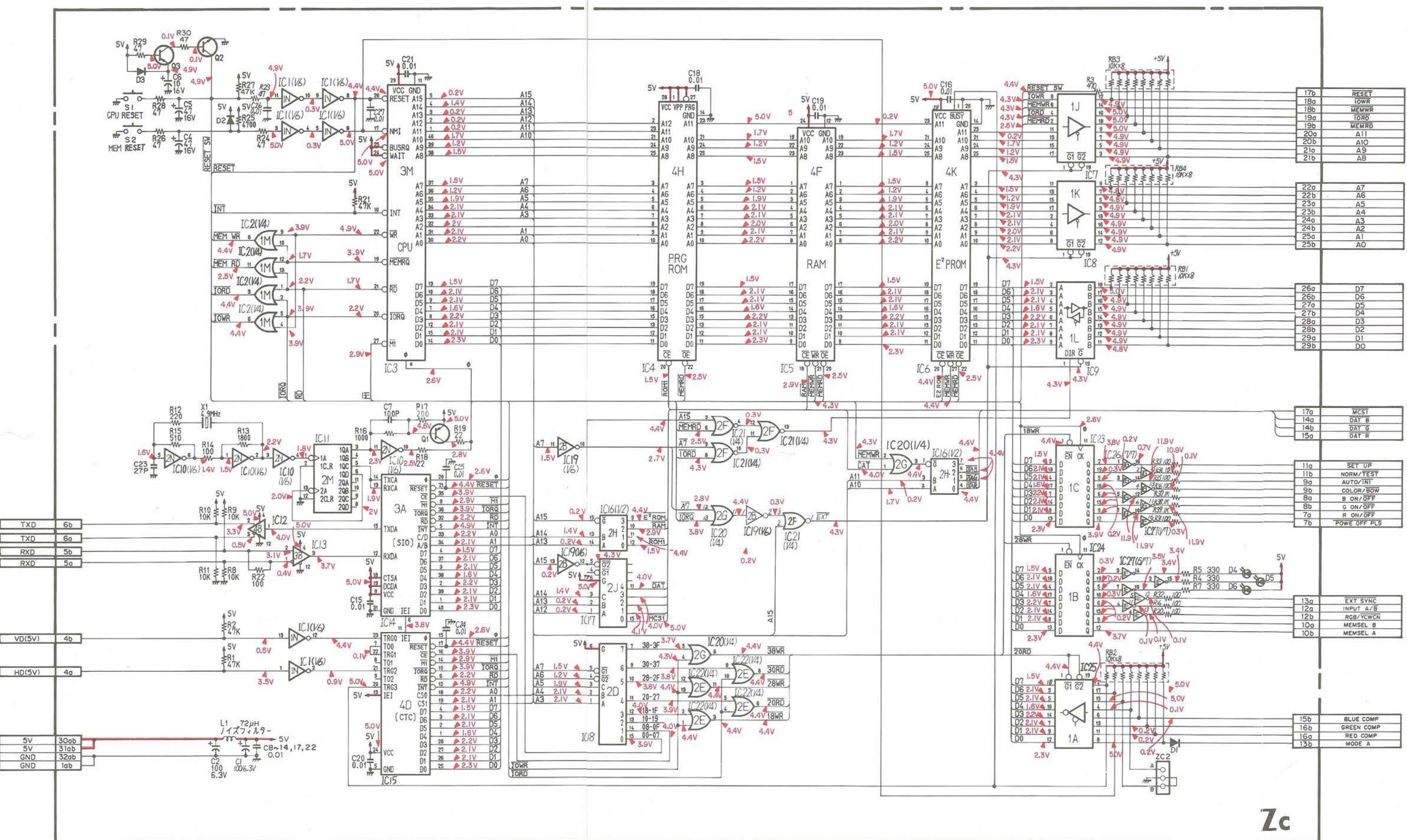
ZC board (CPU/SYSTEM CONTROL)

IC	1 10	2 11	9	8	7 17	16	26 20	21	27 22	18	23	24	25
		3		6		4		5		15		19 13 12	14
Q	2 3		1										
D	2	3											1
								4	5	6			
TP					TPE2								TPE I



- : Conductor side pattern
- : Component side pattern

ZC board (CPU/SYSTEM CONTROL)



ZC ZC

ZC board

IC1	SN74LS14N	
2	SN74LS32N	
3	LH0080A	
4	2764-HDMH-2	
5	CXK5816PN-12L	
6	D2817A	
7	SN74LS244N	
8	SN74LS244N	
9	SN74LS645N	
10	SN74LS04N	
11	SN74LS393N	
12	AM26LS31PC	
13	AM26LS32PC	
14	LH0084A	
15	LH0082A	
16	SN74LS139N	
17	SN74LS138N	
18	SN74LS138N	
19	SN74LS04N	
20	SN74LS32N	
21	SN74LS02N	
22	SN74LS32N	
23	SN74LS377N	
24	SN74LS377N	
25	SN74LS240N	
26	M54519P	
27	M54519P	
Q1	2SA733	
2	2SC2458	
3	2SA733	
D1	1SS119	PROT 1
2	1SS119	PROT 2
3	1SS119	PROT 3
4	TLR214	
5	TLR214	
6	TLR214	

ZD

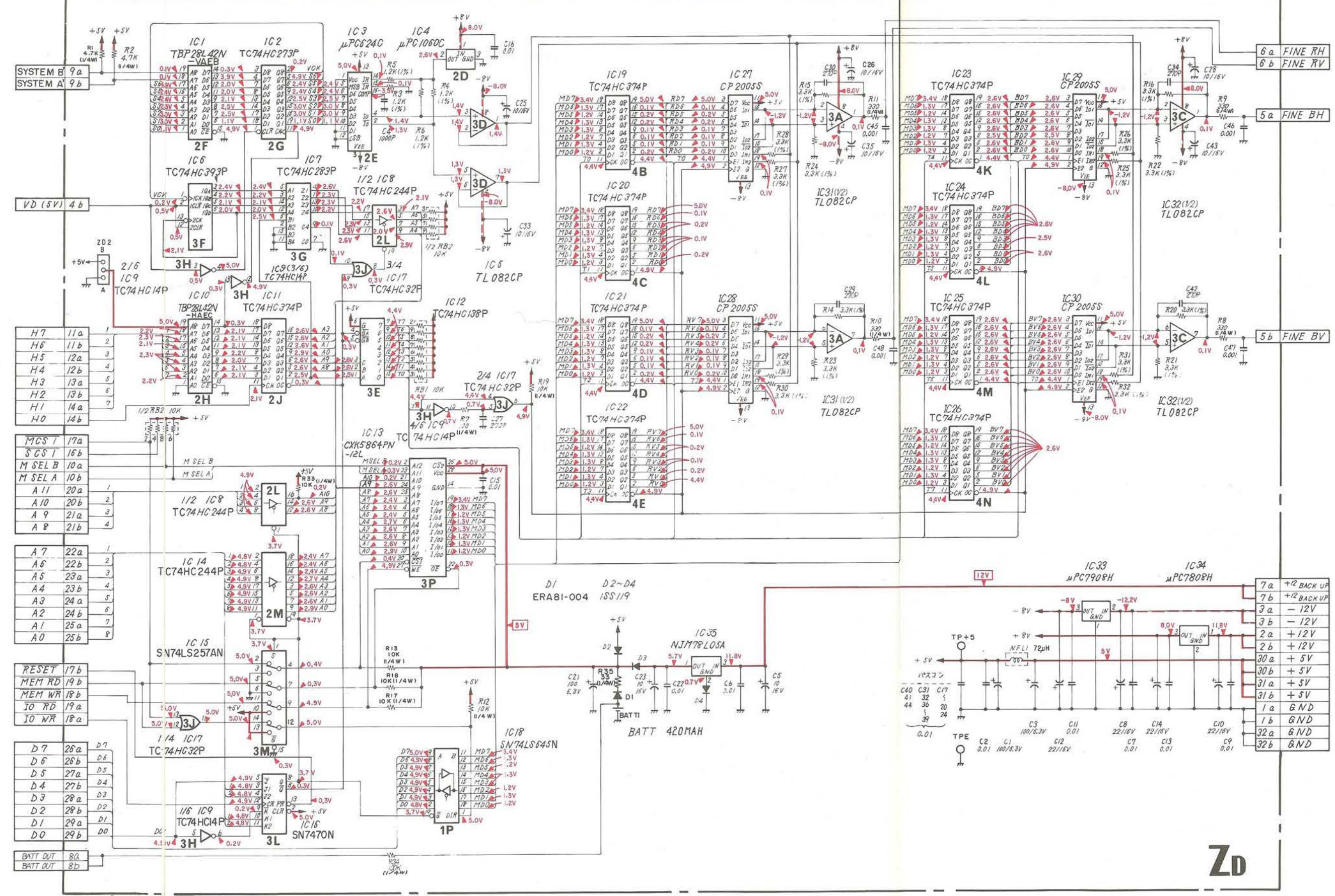
ZD

ZD

ZD board

ZD board (DIGITAL CE CONVERGENCE)

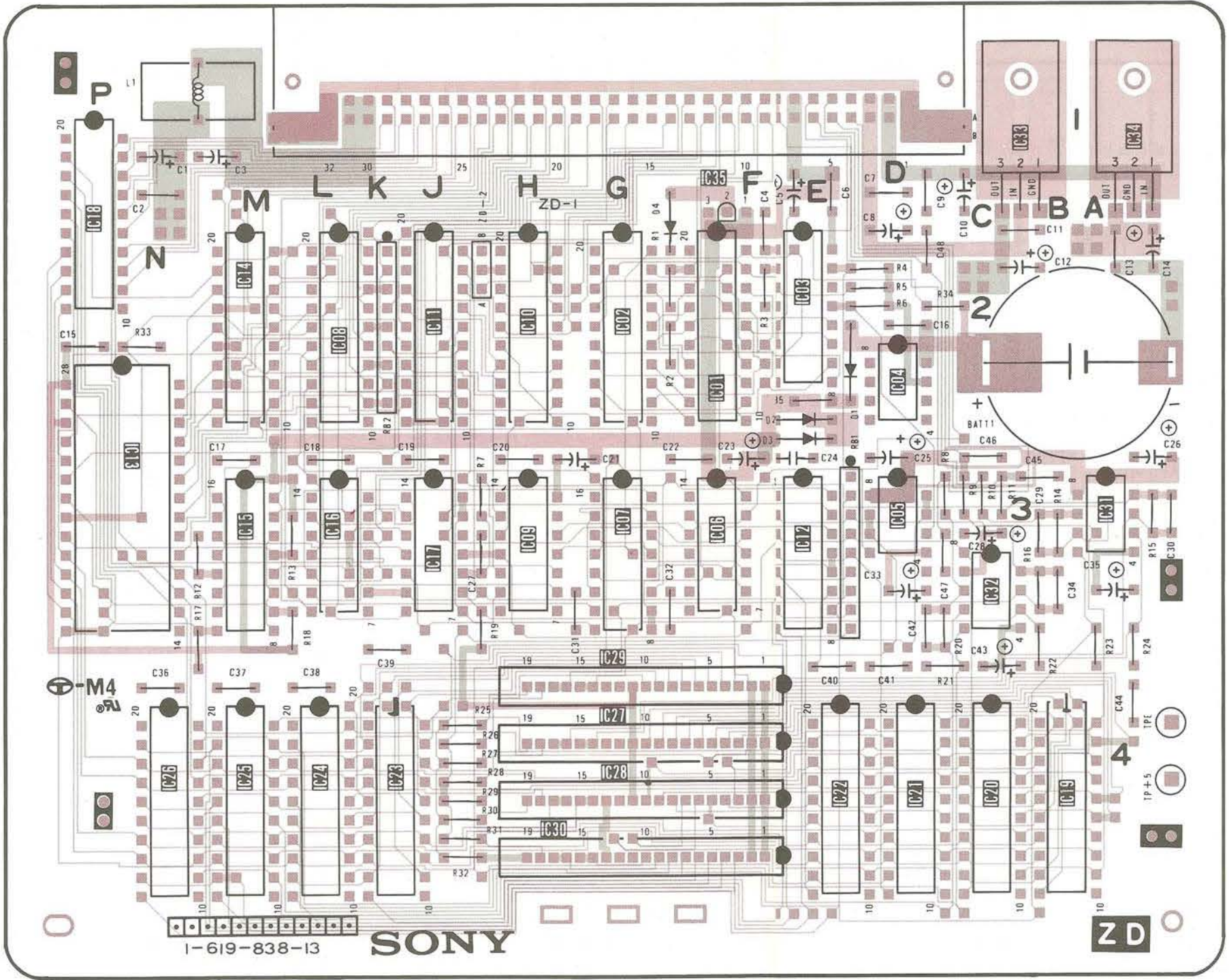
IC1	TBP28L42N-VAEA	V ADRS ENCODE
2	TC74HC273P	LATCH
3	UPC824C	D/A CONVERT
4	UPC1060C	VOLTAGE REF
5	TL082CP	VOLTAGE FOLLOWER
6	TC74HC93P	COUNTER
7	TC74HC283P	LATCH
8	TC74HC244P	BUFFER
9	TC74HC14P	INVERT
10	TBP28S42N-HAEA	H ADRS ENCODE
11	TC74HC374P	LATCH
12	TC74HC138P	ADRS
13	CXK5864PN-12L	MEMORY
14	TC74HC244P	BUFFER
15	SN74LS257AN	SWITCH
16	SN7470N	LATCH
17	TC74HC32P	GATE
18	SN74LS645N	BUFFER
19	TC74HC374P	LATCH
20	TC74HC374P	LATCH
21	TC74HC374P	LATCH
22	TC74HC374P	LATCH
23	TC74HC374P	LATCH
24	TC74HC374P	LATCH
25	TC74HC374P	LATCH
26	TC74HC374P	LATCH
27	CP2005S	D/A CONVERT
28	CP2005S	D/A CONVERT
29	CP2005S	D/A CONVERT
30	CP2005S	D/A CONVERT
31	TL082CP	I-V CONVERT
32	TL082CP	I-V CONVERT
33	UPC7908H	-8V REG
34	UPC7908H	+8V REG
35	NJM78L05A	+5V REG
D1	ERA81-005	PROTECT 1
2	ISS119	PROTECT 2
3	ISS119	PROTECT 3
4	ISS119	PROTECT 4



Zd

ZD board (DIGITAL CE CONVERGENCE)

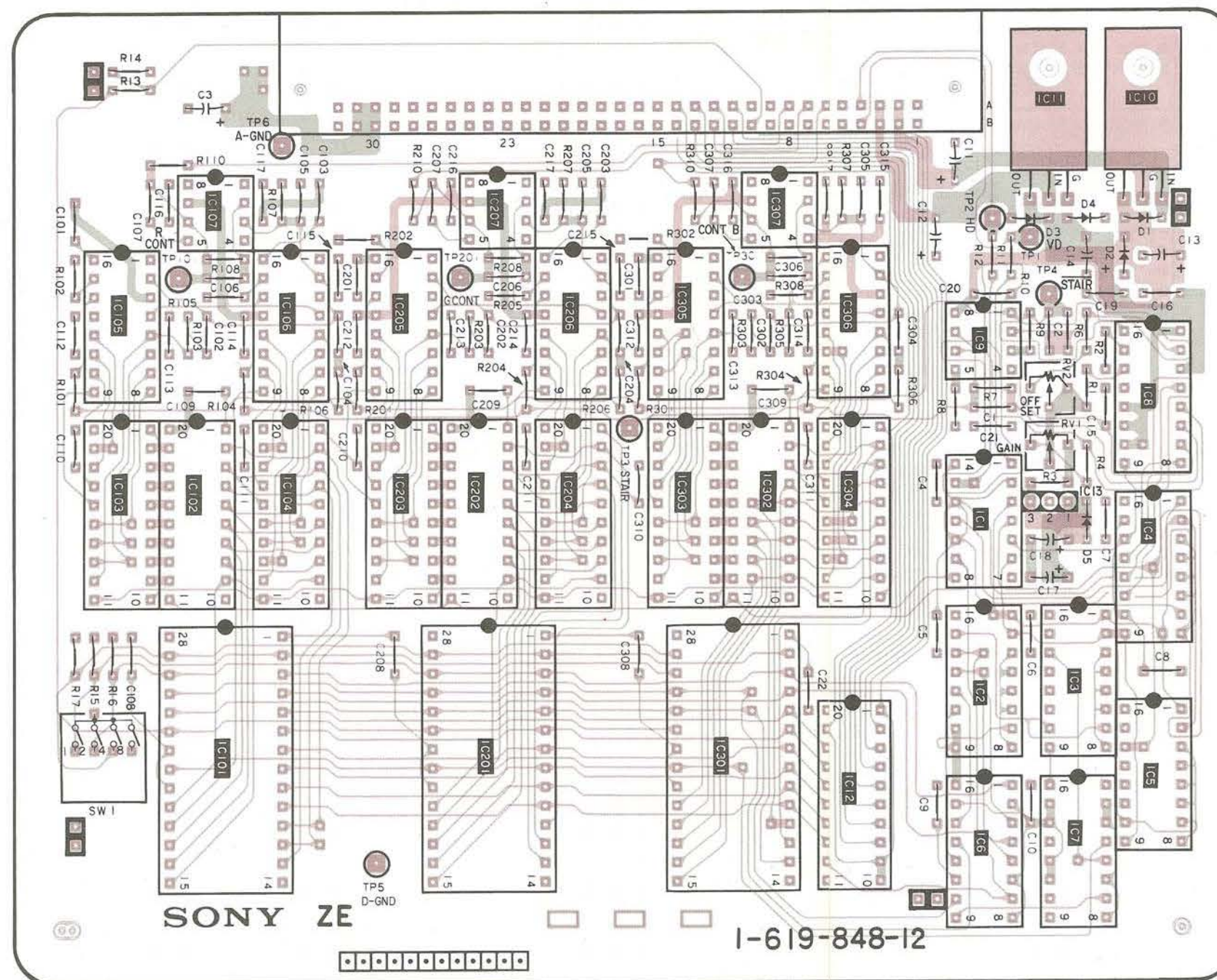
IC	18	14	08	11	10	02	35	03	04	33	34
	13	15	16	17	09	07	01	12	05		31
	26	25	24	23		29	06			32	19
						27		22	21	20	
D						28	4				
						30		2	1		
								3			
TP											TPE TP+5



ZE ZE

ZE board (DIGITAL UNIFORMITY CONTROL)

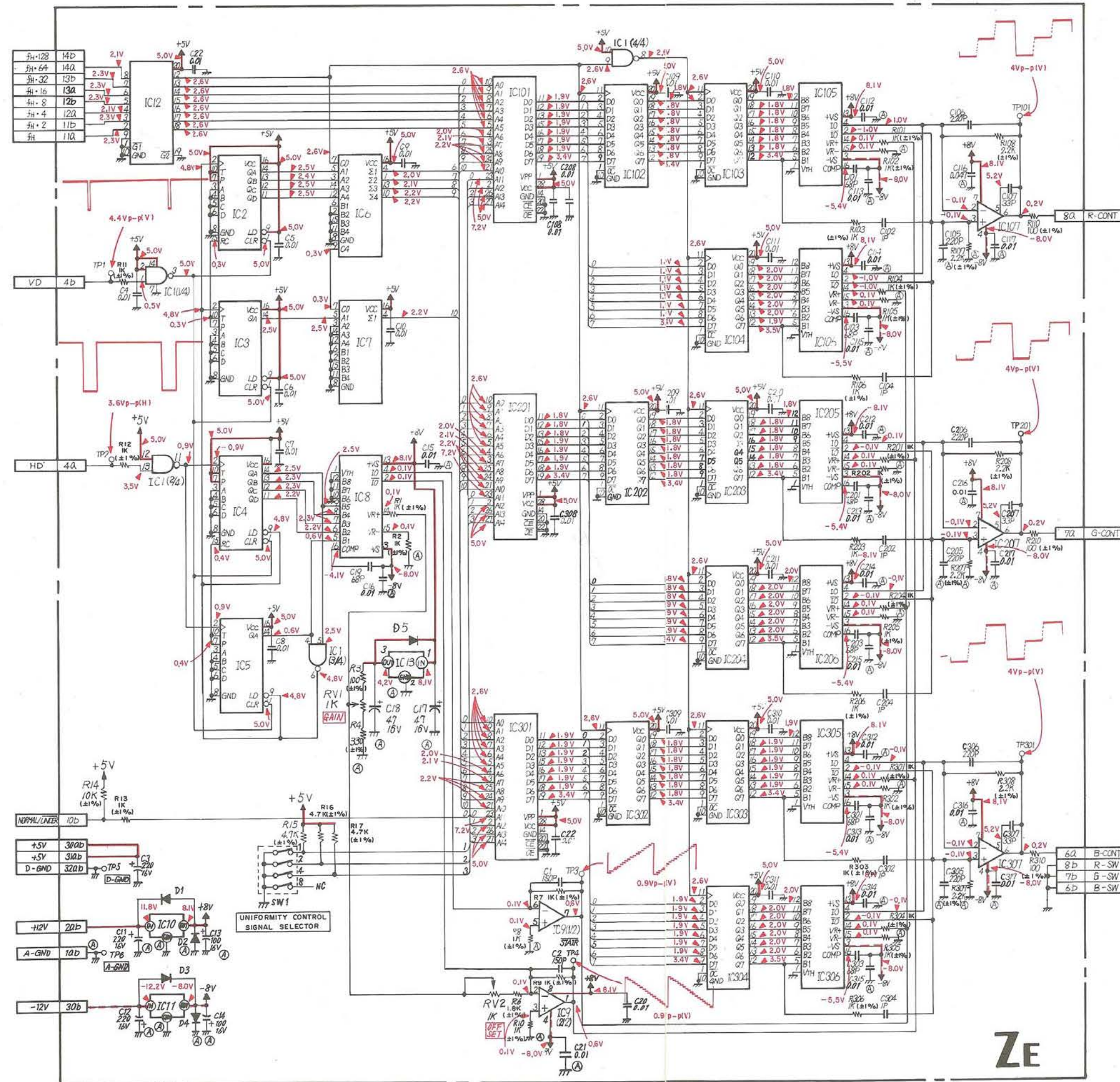
IC	105	107	106	205	207	206	305	307	306	9	11	10
	103	102	104	203	202	204	303	302	304	1	13	8
										2	3	4
D										6	7	5
T P ADJ												



ZE ZE

ZE

ZE board (DIGITAL UNIFORMITY CONTROL)



5-133

ZE board

IC1	TC74HC00P	NAND
2	TC74HC161P	ROW COUNTER (L)
3	TC74HC161P	ROW COUNTER (H)
4	TC74HC161P	RASTER ADRS COUNTER (L)
5	TC74HC161P	RASTER ADRS COUNTER (H)
6	SN74LS283N	ROW ADDER (L)
7	SN74LS283N	ROW ADDER (H)
8	DAC08HQ	RASTER ADRS DAC
9	TL072ACP	STAIR GEN
10	uPC7808H	+8V REG
11	uPC7908H	-8V REG
12	SN74HC541N	COLUMN BUFF
13	AN78L04	+4V REG
101	MBM27C256-25	R D.U.DT PROM
102	TC74HC574P	R HALF CLK DLY
103	TC74HC574P	R CURRENT DT LATCH
104	TC74HC574P	R NEXT DT LATCH
105	DAC08HQ	R CURRENT DT DAC
106	DAC08HQ	R NEXT DT DAC
107	LM318P	R I/V CONV
201	MBM27C256-25	G D.U.DT PROM
202	TC74HC574P	G HALF CLK DLY
203	TC74HC574P	G CURRENT DT LATCH
204	TC74HC574P	G NEXT DT LATCH
205	DAC08HQ	G CURRENT DT DAC
206	DAC08HQ	G NEXT DT DAC
207	LM318P	G I/V CONV
301	MBM27C256-25	B D.U.DT PROM
302	TC74HC574P	B HALF CLK DLY
303	TC74HC574P	B CURRENT DT LATCH
304	TC74HC574P	B NEXT DT LATCH
305	DAC08HQ	B CURRENT DT DAC
306	DAC08HQ	B NEXT DT DAC
307	LM318P	B I/V CONV
D1	1SS119	REG PROT
2	1SS119	REG PROT
3	1SS119	REG PROT
4	1SS119	REG PROT
5	1SS119	REG PROT

5. DIAGRAMS

5-134

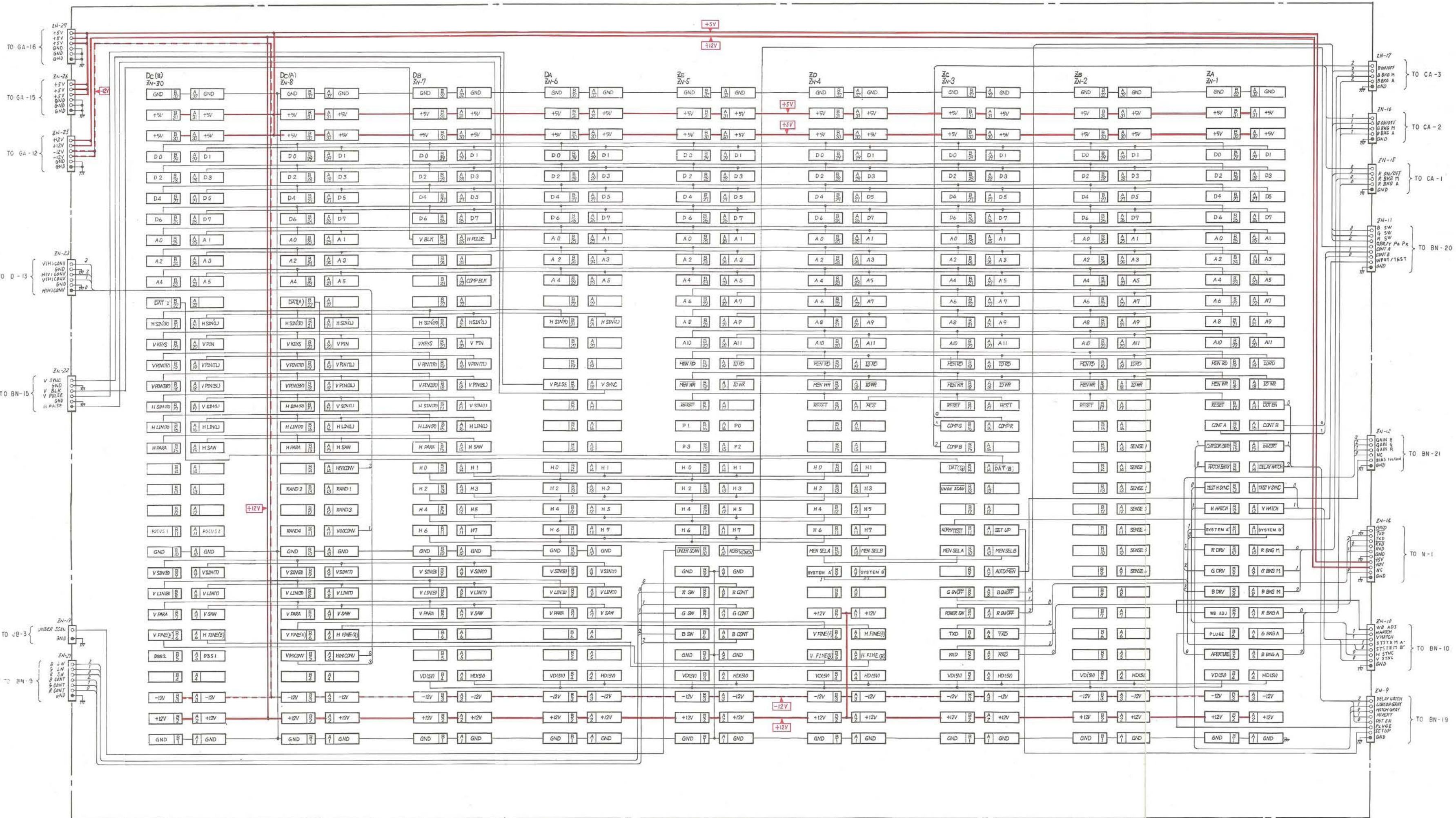
5-135

ZN

ZN board (CONTROL SYSTEM MOTHER BOARD)

ZN

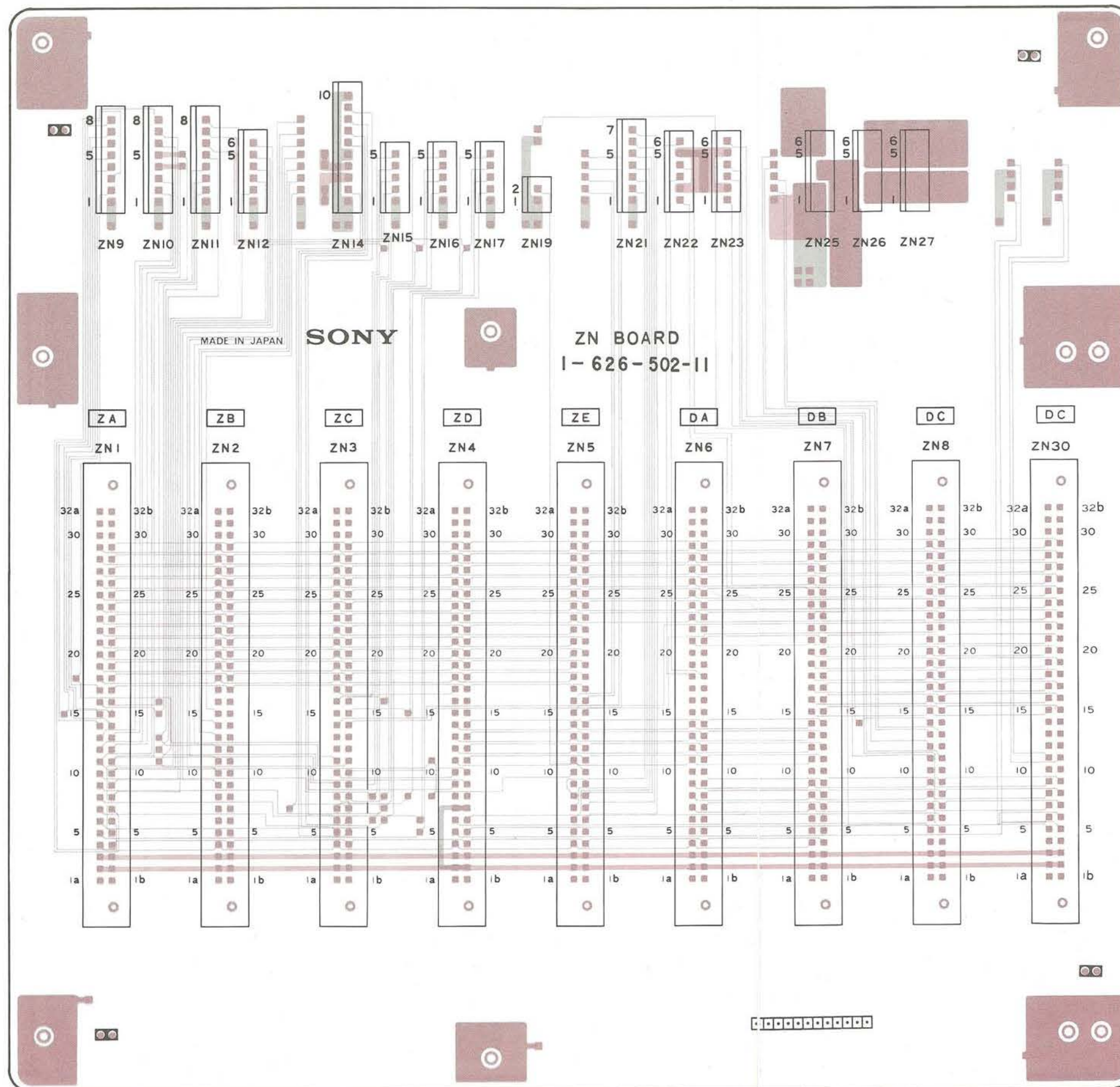
ZN



5. DIAGRAMS

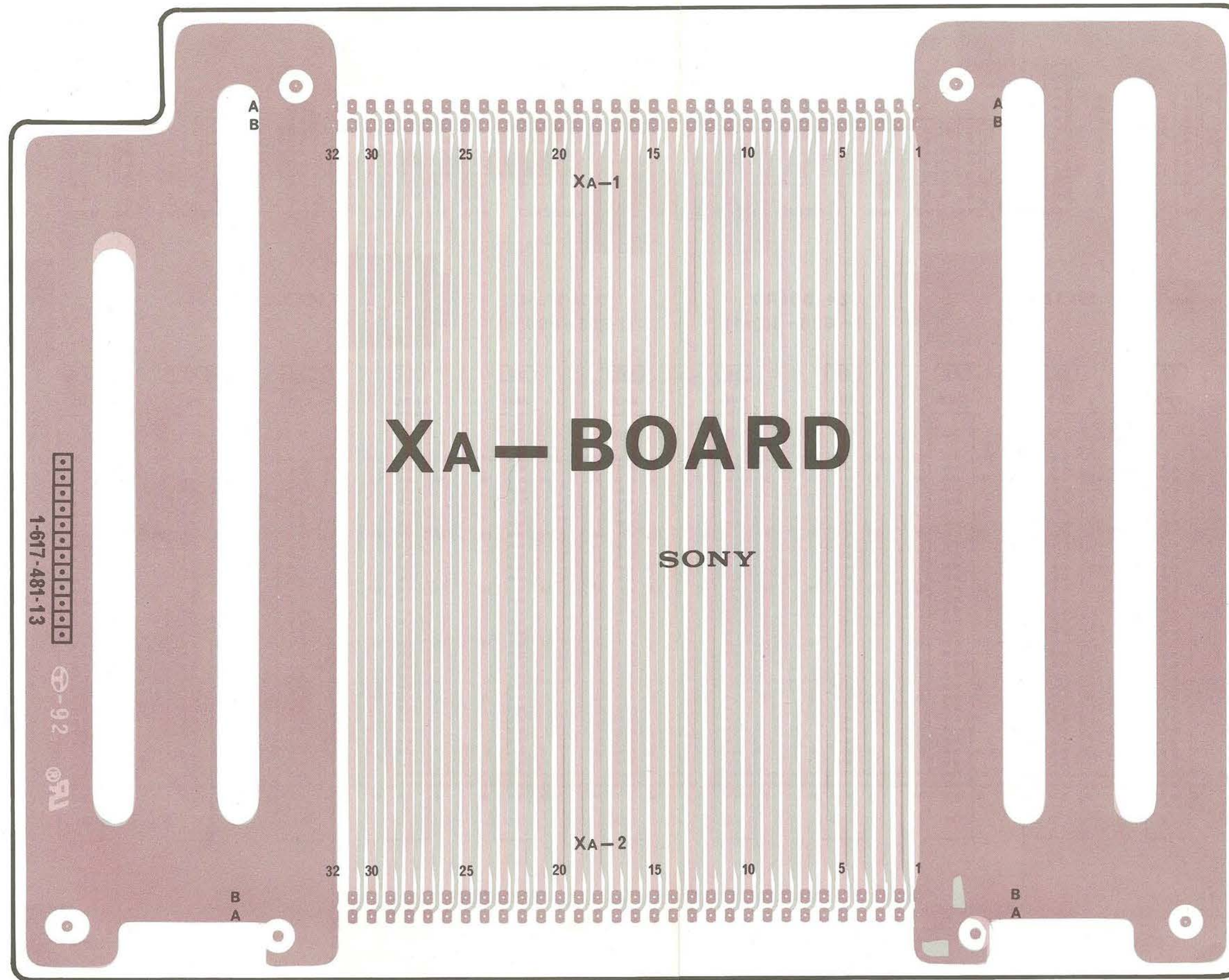
ZN ZN

ZN board (MOTHER BOARD)



XA XA

XA board (EXTENSION BOARD)



- : Conductor side pattern
- : Component side pattern

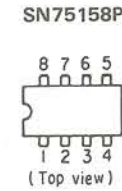
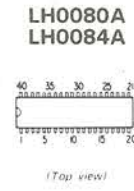
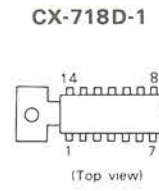
5-4. SEMICONDUCTORS

AM26LS31PC
AM26LS32PC
DAC08H0
HD14053BP
HD74LS175P
MB7112E-HDM
MB74LS161A
MB74LS163A
MB74LS175
MB84051B
MB84053B
MC74HC4053N
M54519P
SN74HC139N
SN74LS137N
SN74LS138N
SN74LS139N
SN74LS151N
SN74LS161AN

SN74LS163AN
SN74LS175N
SN74LS257AN
SN74LS283N
SN74S163N
TC4052BP
TC4053BP
TC74HC109P
TC74HC112P
TC74HC138P
TC74HC139P
TC74HC153P
TC74HC161P
TC74HC193P
TC74HC283P
TC74HC4538P
 μ PD4053BC
 μ PD4520BC
 μ PD4526BC

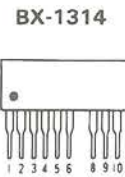
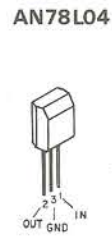
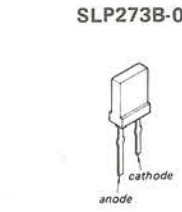
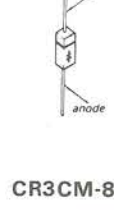
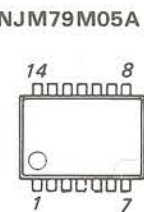
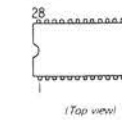
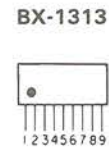
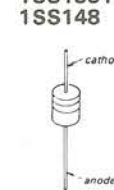
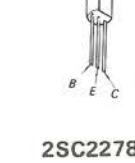
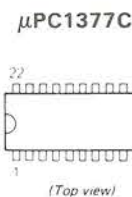
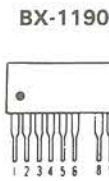
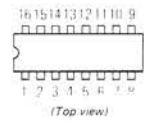
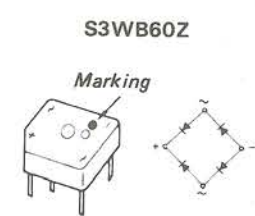
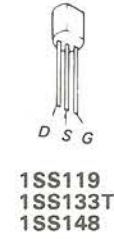
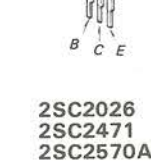
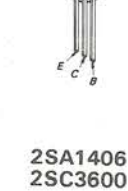
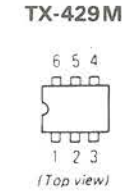
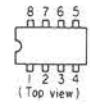
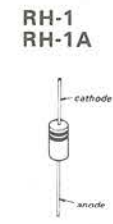
BA4558
BA6993
HA17558
IR9393
LM318P
NJM2903D
NJM4558D
NJM555D
TL072ACP

TL082CP
 μ PC1060C
 μ PC1555C
 μ PC311C
 μ PC318C
 μ PC393C
 μ PC4082C
 μ PC4557C
 μ PC4558C
 μ PC624C

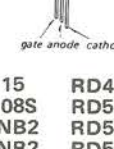
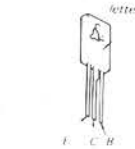
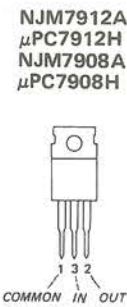
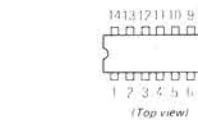
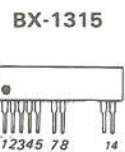
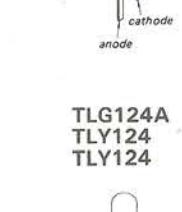
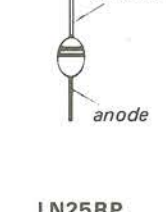
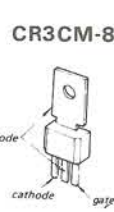
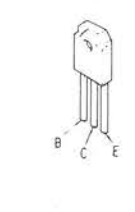
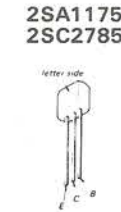
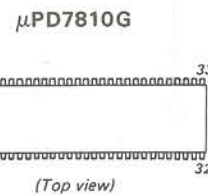
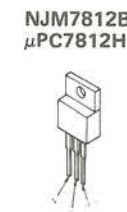


2SA1048
2SA1115
2SC2458
2SC2603
2SC3601
DTA124ES
DTC124ES
DTC144ES

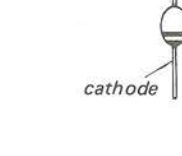
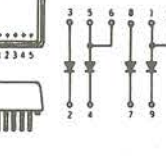
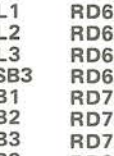
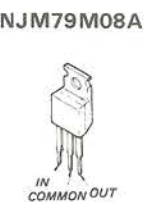
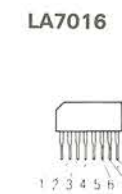
2SB860
2SB861
2SC2335
2SC3317
2SD1137
2SD1138
2SD1138-02-C



HD74LS00P
HD74LS08P
HD74LS32P
HD74LS86P
HD7406P
MB4204
MB74LS00
MB74LS08
MB74LS32
MB74LS86
MC74HC74N
MC1495L
MC1496P
MC1595L
MC4024P
MC4044P
SN74HC36N
SN74LS00N
SN74LS02N
SN74LS04N
SN74LS08N
SN74LS14N



CP2005S
MC74HC541N
SN74LS240N
SN74LS244N
SN74LS273N
SN74LS377N
SN74LS645N
SN74LS682N
SN74S374N
TBP28L42N-VAEA
TBP28S42N-HAEB
TC74HC244P
TC74HC273P
TC74HC373P
TC74HC374P
TC74HC574P



SECTION 6 EXPLODED VIEWS

NOTE:

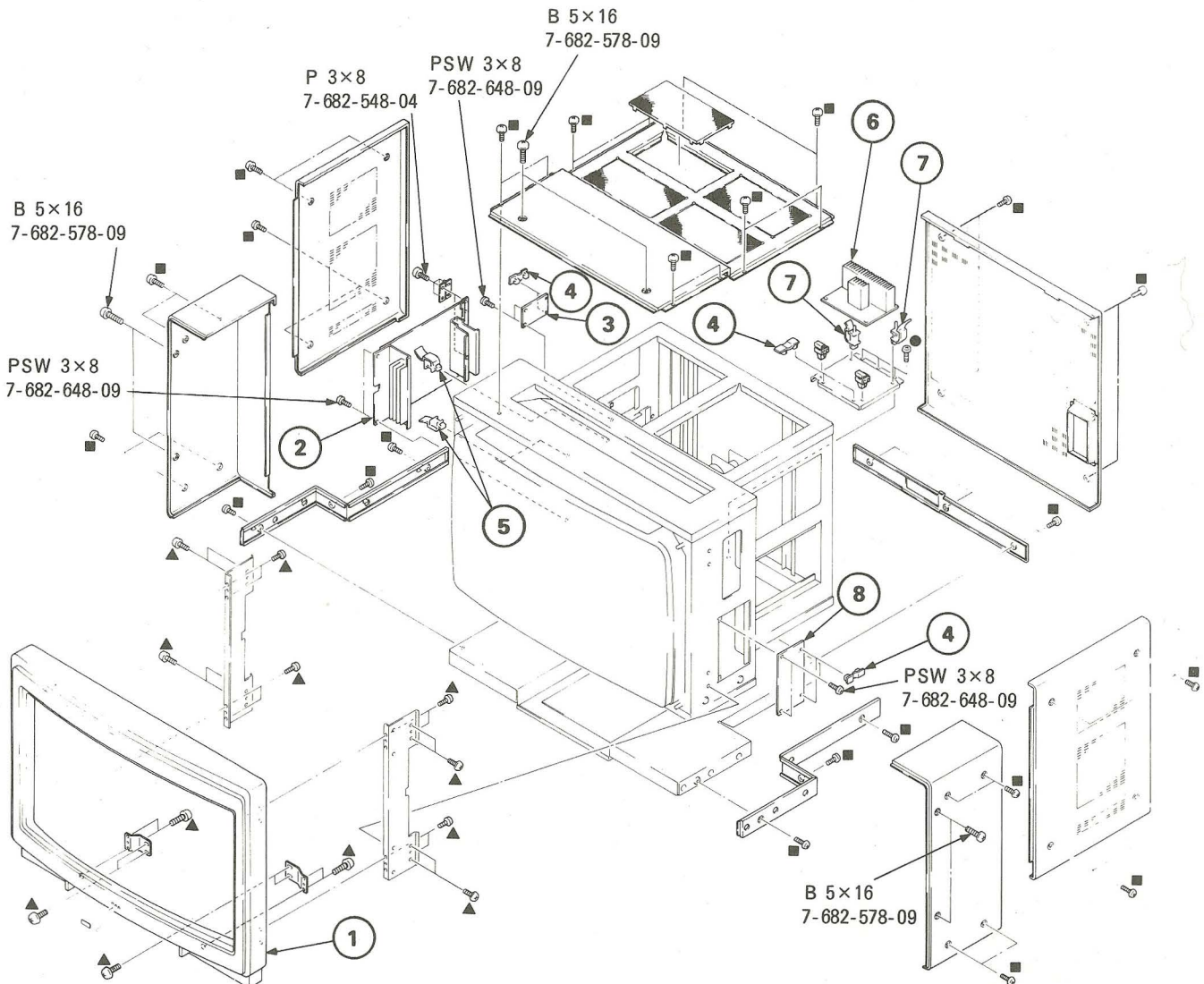
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

The components identified by shading and mark are critical for safety. Replace only with part number specified.

6-1. BEZEL

- : BVTP 3×8 7-685-646-79
- ▲ : BVTP 4×12 7-685-661-14
- : B 4×8 7-682-561-09



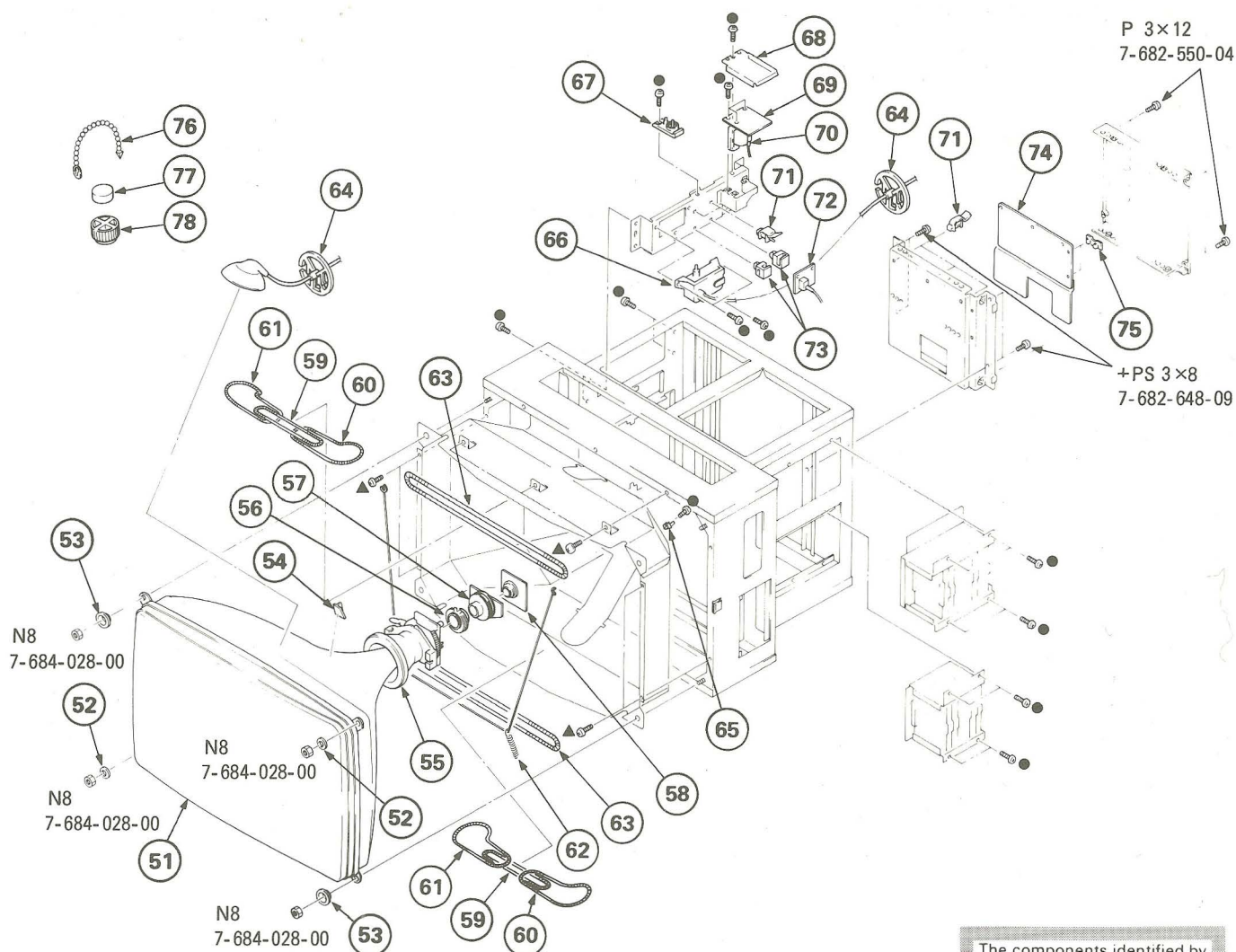
No.	Part No.	Description
1	*X-4378-932-1	BEZEL ASSY
2	*A-1345-778-A	E BOARD, COMPLETE
3	*1-626-505-11	U BOARD
4	*4-313-732-00	CLIP, HINGE, CIRCUIT BOARD

Remark	No.	Part No.	Description	Remark
	5	*4-321-929-00	HOLDER, PC BOARD	
	6	*1-626-504-11	GA BOARD	
	7	*3-703-141-00	HOLDER, PCB	
	8	*A-1394-157-A	R BOARD, COMPLETE	

6-2. PICTURE TUBE

● : BVTP 3×8 7-685-646-79

▲ : BVTP 4×12 7-685-661-14

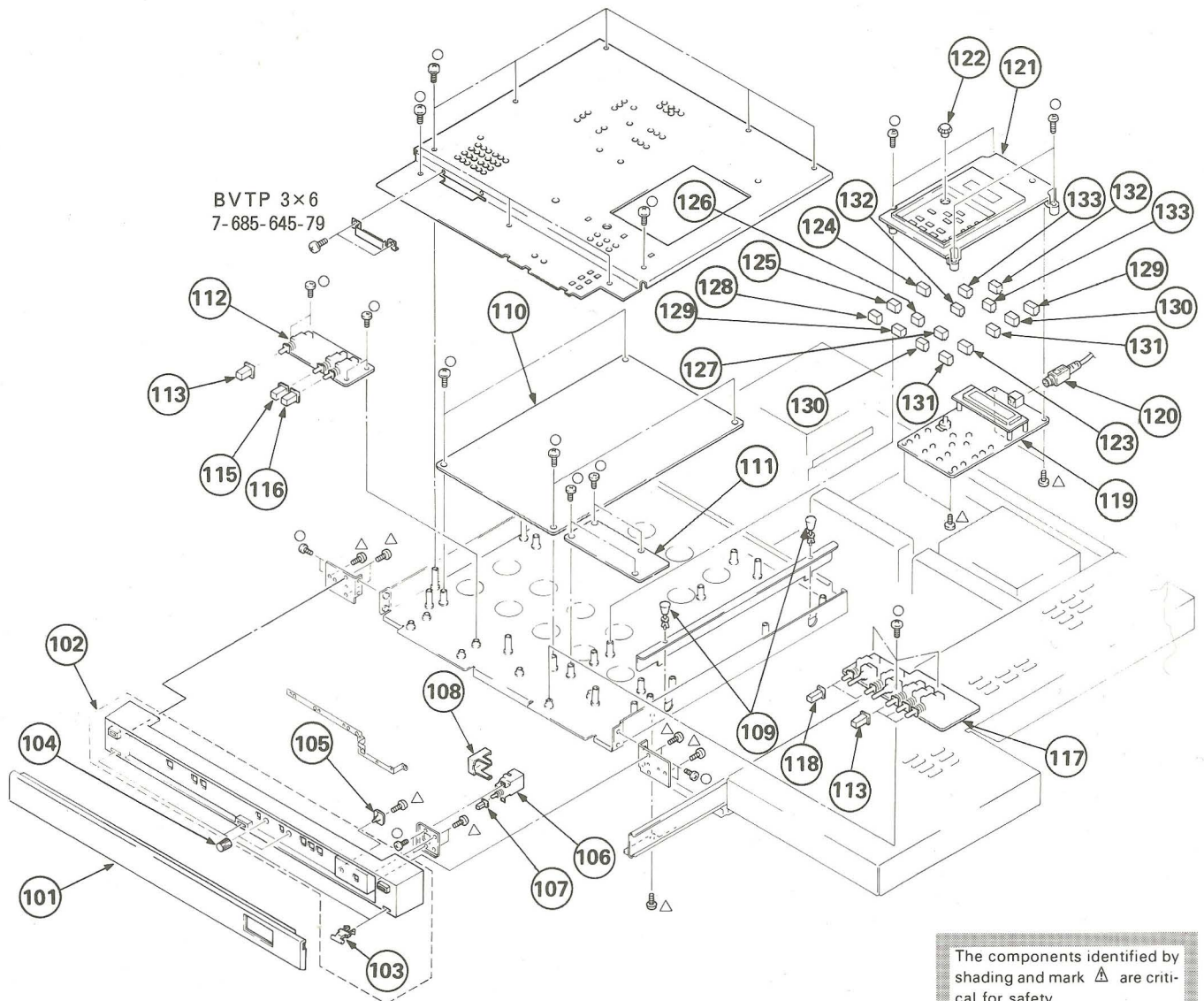


The components identified by shading and mark ▲ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark	No.	Part No.	Description	Remark
51	▲ 8-734-221-75	PICTURE TUBE SD-181 (41 HDF)		66	▲ 1-453-107-21	HIGH-VOLTAGE BLOCK (DCT BLOCK)	
52	4-391-512-01	WASHER		67	▲ 1-230-618-11	RESISTOR ASSY, HIGH-VOLTAGE	
53	4-383-375-01	WASHER		68	*4-383-317-01	COVER, FB	
54	3-703-003-00	SPACER, DY		69	*1-617-480-11	P BOARD	
55	▲ 1-451-326-11	DEFLECTION YOKE (SY-181)		70	▲ 1-439-381-11	TRANSFORMER ASSY, FLYBACK	
56	▲ 1-452-261-22	PICTURE TUBE NECK ASSY (362)		71	*3-703-141-00	HOLDER, PCB	
57	▲ 1-452-262-41	PICTURE TUBE NECK ASSY (361)		72	*1-610-380-12	K BOARD	
58	*1-617-465-11	CB BOARD		73	*3-701-903-00	HOLDER, PC BOARD	
59	1-426-380-11	COIL, LANDING CORRECTION (A)		74	*A-1335-005-A	CA BOARD, COMPLETE	
60	1-426-379-21	COIL, LANDING CORRECTION		75	*4-313-732-00	CLIP, HINGE, CIRCUIT BOARD	
61	1-426-379-11	COIL, LANDING CORRECTION		76	4-308-870-00	CLIP, LEAD WIRE	
62	4-369-318-00	SPRING, TENSION		77	1-452-032-00	MAGNET, DISK; 10MM ø	
63	▲ 1-426-381-11	COIL, DEMAGNETIZATION		78	1-452-094-00	MAGNET, ROTATABLE DISK; 15MM ø	
64	*3-704-372-01	HOLDER, HW CABLE					
65	*4-309-624-00	TERMINAL, EARTH					

6-3. DRAWER BLOCK

○ : P 3×6 7-682-547-09
 △ : BVTP 3×12 7-685-648-79

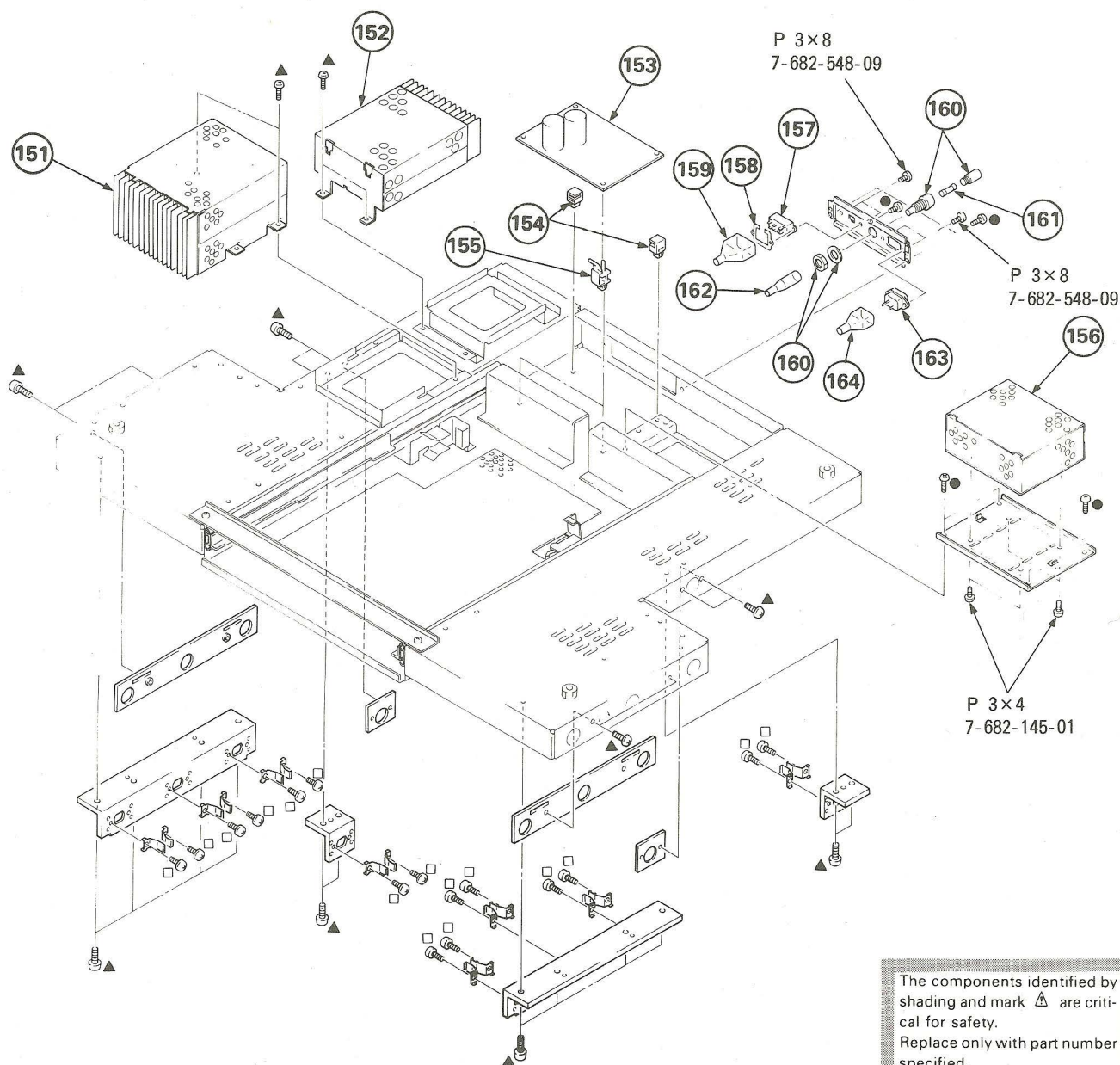


The components identified by shading and mark △ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark	No.	Part No.	Description	Remark
101	X-4378-933-1	DOOR ASSY, CONTROL		118	4-378-903-01	BUTTON (B)	
102	X-4378-934-1	PANEL ASSY, CONTROL		119	*A-1285-074-A	N BOARD, COMPLETE	
103	3-662-365-00	SHAFT (S), DOOR	103	120	*1-559-134-11	CONNECTOR ASSY	
104	4-378-916-01	KNOB, VOL		121	X-4378-922-1	COVER (N) ASSY	
105	*1-627-689-11	Y BOARD		122	4-383-316-01	KNOB (B), VOL	
106	△ 1-570-052-12	SWITCH, PUSH (AC POWER)(1 KEY)		123	X-4378-909-1	PLATE (CUR) ASSY, SWITCH	
107	4-378-925-11	BUTTON (A)		124	X-4378-910-1	PLATE (APER) ASSY, SWITCH	
108	4-373-038-01	COVER, SWITCH, POWER		125	X-4378-911-1	PLATE (MODE) ASSY, SWITCH	
109	3-703-356-00	RIVET, T TYPE		126	X-4378-912-1	PLATE (BACK) ASSY, SWITCH	
110	*A-1345-779-A	D BOARD, COMPLETE		127	X-4378-913-1	PLATE (FOR) ASSY, SWITCH	
111	*1-619-842-11	W BOARD		128	X-4378-914-1	PLATE (IN) ASSY, SWITCH	
112	*1-627-688-11	JB BOARD		129	X-4378-915-1	PLATE (R) ASSY, SWITCH	
113	4-378-925-01	BUTTON (A)		130	X-4378-916-1	PLATE (G) ASSY, SWITCH	
115	4-378-925-31	BUTTON (A)		131	X-4378-917-1	PLATE (B) ASSY, SWITCH	
116	4-378-925-41	BUTTON (A)		132	X-4378-918-1	PLATE (V) ASSY, SWITCH	
117	*1-626-506-11	JA BOARD		133	X-4378-919-1	PLATE (H) ASSY, SWITCH	

6-4. BOTTOM CHASSIS

- : BVTP 3×8 7-685-646-79
- ▲ : BVTP 4×12 7-685-661-14
- : PS 3×8 7-682-648-09

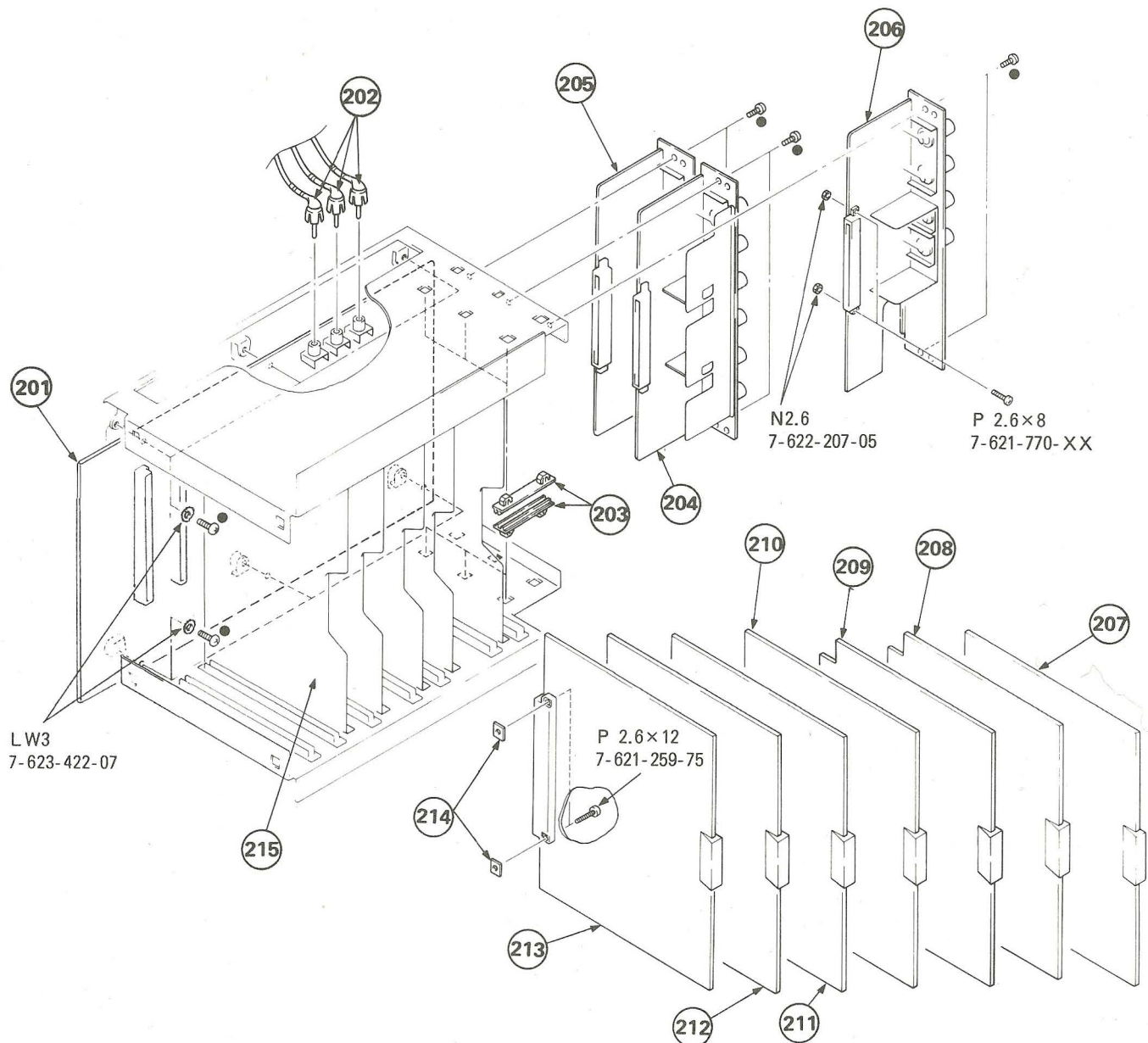


The components identified by shading and mark ▲ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark	No.	Part No.	Description	Remark
151	▲.1-413-287-12	REGULATOR, SWITCHING (TK-18)		159	*4-371-879-02	COVER, AC SELECT	
152	▲.1-413-251-13	SWITCHING REGULATOR (SF-11)		160	1-533-148-00	HOLDER, FUSE	
153	*1-619-844-11	F BOARD		161	▲.1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-3830E ONLY)	
154	*3-701-903-00	HOLDER, PC BOARD			▲.1-532-748-11	FUSE, GLASS TUBE 6.3A/125V (HDM-3830 ONLY)	
155	*3-703-141-00	HOLDER, PCB		162	*4-371-803-01	COVER, FUSE HOLDER	
156	▲.1-413-227-11	SWITCHING REGULATOR (CR-15EN)		163	▲.1-509-546-11	3P INLET	
157	▲.1-570-173-21	SWITCH, VOLTAGE CHANGE		164	4-601-466-11	COVER, 3P INLET	
158	*4-379-409-01	NUT, PLATE					

6-5. B BLOCK

●: BVTP 3×8 7-685-646-79

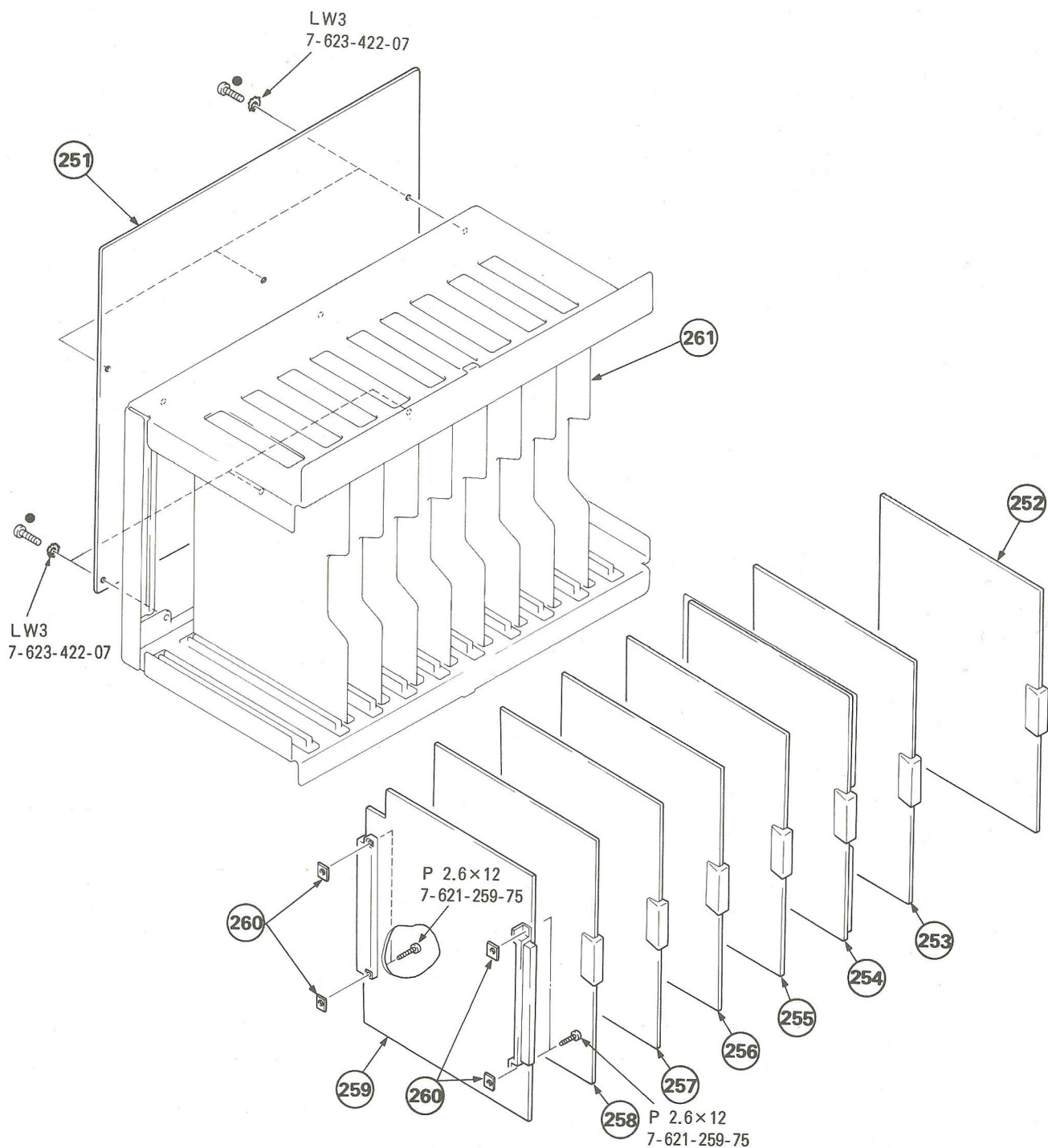


No.	Part No.	Description
201	*1-626-497-11	BN BOARD
202	*1-557-152-91	CABLE, PIN
203	*3-680-613-11	SUPPORT, PC BOARD
204	*A-1275-089-A	QA BOARD, COMPLETE
205	*A-1275-090-A	QB BOARD, COMPLETE
206	*A-1275-091-A	QC BOARD, COMPLETE
207	*A-1135-524-A	BA BOARD, COMPLETE
208	*A-1296-450-A	BB BOARD, COMPLETE

Remark	No.	Part No.	Description	Remark
	209	*A-1296-194-A	BC BOARD, COMPLETE	
	210	*A-1135-525-A	BD BOARD, COMPLETE	
	211	*A-1296-451-A	BE BOARD, COMPLETE	
	212	*A-1296-452-A	BF BOARD, COMPLETE	
	213	*A-1296-453-A	BG BOARD, COMPLETE	
	214	4-378-915-01	NUT (M 2.6), PLATE	
	215	*4-378-928-01	PLATE, SHIELD	

6-6. Z BLOCK

● : BVTP 3×8 7-685-646-79



No.	Part No.	Description	Remark	No.	Part No.	Description	Remark
251	*1-626-502-11	ZN BOARD		257	*A-1345-651-A	DB BOARD, COMPLETE	
252	*A-1394-142-A	ZA BOARD, COMPLETE		258	*A-1345-652-A	DC BOARD, COMPLETE	
253	*A-1394-143-A	ZC BOARD, COMPLETE		259	*A-1389-709-A	XA BOARD, COMPLETE	
254	*A-1394-168-A	ZD BOARD, COMPLETE		260	4-378-915-01	NUT (M 2.6), PLATE	
255	*A-1394-098-A	ZE BOARD, COMPLETE		261	*4-378-928-01	PLATE, SHIELD	
256	*A-1345-650-A	DA BOARD, COMPLETE					

SECTION 7 ELECTRICAL PARTS LIST

BA

NOTE:

The components identified by shading and mark Δ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque Δ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

• Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

• All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

RESISTORS

• All resistors are in ohms
• F : nonflammable

When indicating parts by reference number, please include the board name.

CAPACITORS

• MF : μ F, PF : μ μ F

COILS

• MMH : mH, UH : μ H

• The components identified by \boxtimes in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
	*A-1135-524-A	BA BOARD, COMPLETE *****		C219	1-126-233-11	ELECT 22MF	20% 25V
	*4-353-708-00	HOOK, FINGER		C220	1-126-233-11	ELECT 22MF	20% 25V
		CONNECTOR		C221	1-101-004-00	CERAMIC 0.01MF	50V
BA1	*1-562-729-11	CONNECTOR, MULTI 64P		C222	1-101-004-00	CERAMIC 0.01MF	50V
	4-378-915-01	NUT (M2.6), PLATE; BA1		C223	1-126-233-11	ELECT 22MF	20% 25V
BA2	*1-562-454-11	CONNECTOR 15P		C224	1-124-631-11	ELECT 47MF	20% 16V
BA3	*1-562-454-11	CONNECTOR 15P		C301	1-101-004-00	CERAMIC 0.01MF	50V
BA4	*1-562-455-11	CONNECTOR 22P		C302	1-126-233-11	ELECT 22MF	20% 25V
S1	*1-561-724-00	SOCKET, CONNECTOR 2P		C303	1-101-004-00	CERAMIC 0.01MF	50V
S1	*1-564-431-11	POST, CONNECTOR 3P		C304	1-126-233-11	ELECT 22MF	20% 25V
		CAPACITOR		C305	1-124-499-11	ELECT 1MF	20% 50V
C101	1-126-233-11	ELECT 22MF	20% 25V	C306	1-126-233-11	ELECT 22MF	20% 25V
C102	1-101-004-00	CERAMIC 0.01MF	50V	C307	1-126-233-11	ELECT 22MF	20% 25V
C103	1-101-004-00	CERAMIC 0.01MF	50V	C308	1-101-004-00	CERAMIC 0.01MF	50V
C104	1-126-233-11	ELECT 22MF	20% 25V	C309	1-101-004-00	CERAMIC 0.01MF	50V
C105	1-101-004-00	CERAMIC 0.01MF	50V	C310	1-126-101-11	ELECT 100MF	20% 16V
C106	1-126-233-11	ELECT 22MF	20% 25V	C311	1-126-101-11	ELECT 100MF	20% 16V
C107	1-101-004-00	CERAMIC 0.01MF	50V	C312	1-126-233-11	ELECT 22MF	20% 25V
C108	1-101-004-00	CERAMIC 0.01MF	50V	C313	1-126-233-11	ELECT 22MF	20% 25V
C109	1-126-233-11	ELECT 22MF	20% 25V	C314	1-101-004-00	CERAMIC 0.01MF	50V
C110	1-126-233-11	ELECT 22MF	20% 25V	C315	1-101-004-00	CERAMIC 0.01MF	50V
C111	1-101-004-00	CERAMIC 0.01MF	50V	C316	1-124-120-11	ELECT 220MF	20% 25V
C114	1-101-004-00	CERAMIC 0.01MF	50V	C317	1-124-120-11	ELECT 220MF	20% 25V
C115	1-126-233-11	ELECT 22MF	20% 25V	C318	1-124-477-11	ELECT 47MF	20% 25V
C116	1-101-004-00	CERAMIC 0.01MF	50V	C319	1-124-477-11	ELECT 47MF	20% 25V
C117	1-101-004-00	CERAMIC 0.01MF	50V	C320	1-101-004-00	CERAMIC 0.01MF	50V
C120	1-101-004-00	CERAMIC 0.01MF	50V	C321	1-126-233-11	ELECT 22MF	20% 25V
C121	1-126-233-11	ELECT 22MF	20% 25V	C322	1-101-004-00	CERAMIC 0.01MF	50V
C122	1-126-233-11	ELECT 22MF	20% 25V	C323	1-126-233-11	ELECT 22MF	20% 25V
C123	1-101-004-00	CERAMIC 0.01MF	50V	C324	1-124-499-11	ELECT 1MF	20% 50V
C124	1-101-004-00	CERAMIC 0.01MF	50V	C325	1-126-233-11	ELECT 22MF	20% 25V
C125	1-126-233-11	ELECT 22MF	20% 25V	C326	1-126-233-11	ELECT 22MF	20% 25V
C126	1-101-004-00	CERAMIC 0.01MF	50V	C327	1-101-004-00	CERAMIC 0.01MF	50V
C128	1-126-233-11	ELECT 22MF	20% 25V	C328	1-126-233-11	ELECT 22MF	20% 25V
C201	1-124-646-00	ELECT 22MF	20% 16V	C329	1-101-004-00	CERAMIC 0.01MF	50V
C203	1-124-631-11	ELECT 47MF	20% 16V	C330	1-126-233-11	ELECT 22MF	20% 25V
C205	1-126-233-11	ELECT 22MF	20% 25V	C331	1-124-499-11	ELECT 1MF	20% 50V
C207	1-126-233-11	ELECT 22MF	20% 25V	C332	1-126-233-11	ELECT 22MF	20% 25V
C208	1-126-233-11	ELECT 22MF	20% 25V	C333	1-126-233-11	ELECT 22MF	20% 25V
C209	1-126-233-11	ELECT 22MF	20% 25V	C334	1-124-499-11	ELECT 1MF	20% 50V
C210	1-126-233-11	ELECT 22MF	20% 25V	C335	1-124-499-11	ELECT 1MF	20% 50V
C211	1-126-233-11	ELECT 22MF	20% 25V	C336	1-124-499-11	ELECT 1MF	20% 50V
C212	1-101-004-00	CERAMIC 0.01MF	50V	C337	1-124-499-11	ELECT 1MF	20% 50V
C213	1-101-004-00	CERAMIC 0.01MF	50V	C338	1-124-499-11	ELECT 1MF	20% 50V
C214	1-126-233-11	ELECT 22MF	20% 25V	C339	1-124-499-11	ELECT 1MF	20% 50V
C215	1-101-004-00	CERAMIC 0.01MF	50V	C340	1-101-004-00	CERAMIC 0.01MF	50V
C217	1-126-233-11	ELECT 22MF	20% 25V				
						DIODE	
				D101	8-719-100-71	DIODE RD15E-B2	
				D200	8-719-100-68	DIODE RD13E-B2	
				D201	8-719-911-19	DIODE 1SS119	
				D203	8-719-911-19	DIODE 1SS119	

BA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
D205	8-719-100-71	DIODE RD15E-B2		R113	1-249-405-11	CARBON 100 5% 1/4W	
D207	8-719-911-19	DIODE 1SS119		R114	1-249-405-11	CARBON 100 5% 1/4W	
D208	8-719-911-19	DIODE 1SS119		R115	1-249-421-11	CARBON 2.2K 5% 1/4W	
D209	8-719-911-19	DIODE 1SS119		R116	1-249-405-11	CARBON 100 5% 1/4W	
D210	8-719-911-19	DIODE 1SS119		R117	1-249-405-11	CARBON 100 5% 1/4W	
D211	8-719-911-19	DIODE 1SS119		R118	1-215-393-00	METAL 68 1% 1/6W	
D212	8-719-911-19	DIODE 1SS119		R119	1-249-437-11	CARBON 47K 5% 1/4W	
D213	8-719-911-19	DIODE 1SS119		R120	1-249-437-11	CARBON 47K 5% 1/4W	
D214	8-719-911-19	DIODE 1SS119		R121	1-249-437-11	CARBON 47K 5% 1/4W	
D215	8-719-911-19	DIODE 1SS119		R122	1-249-405-11	CARBON 100 5% 1/4W	
D216	8-719-911-19	DIODE 1SS119		R123	1-249-405-11	CARBON 100 5% 1/4W	
D301	8-719-971-20	DIODE ERC38-06		R124	1-249-435-11	CARBON 33K 5% 1/4W	
D302	8-719-971-20	DIODE ERC38-06		R125	1-249-405-11	CARBON 100 5% 1/4W	
D305	8-719-911-19	DIODE 1SS119		R126	1-249-427-11	CARBON 6.8K 5% 1/4W	
D306	8-719-911-19	DIODE 1SS119		R127	1-249-405-11	CARBON 100 5% 1/4W	
D307	8-719-911-19	DIODE 1SS119		R128	1-249-421-11	CARBON 2.2K 5% 1/4W	
D308	8-719-911-19	DIODE 1SS119		R129	1-215-393-00	METAL 68 1% 1/6W	
<u>IC</u>				R130	1-249-405-11	CARBON 100 5% 1/4W	
IC101	8-759-800-81	IC LA7016		R201	1-249-437-11	CARBON 47K 5% 1/4W	
IC102	8-759-800-81	IC LA7016		R203	1-249-465-11	CARBON 47K 5% 1/4W	
IC103	8-759-800-81	IC LA7016		R205	1-249-465-11	CARBON 47K 5% 1/4W	
IC202	8-759-800-81	IC LA7016		R207	1-247-901-11	CARBON 820K 5% 1/4W	
IC203	8-759-250-24	IC TC5024BP		R209	1-247-901-11	CARBON 820K 5% 1/4W	
IC204	8-759-250-25	IC TC5025BP		R211	1-249-405-11	CARBON 100 5% 1/4W	
IC301	8-759-400-29	IC AN78L04		R213	1-249-405-11	CARBON 100 5% 1/4W	
IC303	8-759-700-67	IC NJM79L08A		R215	1-249-405-11	CARBON 100 5% 1/4W	
IC305	8-759-602-66	IC M5230L-A		R219	1-249-405-11	CARBON 100 5% 1/4W	
IC306	8-759-602-66	IC M5230L-A		R220	1-249-405-11	CARBON 100 5% 1/4W	
IC307	8-759-602-66	IC M5230L-A		R222	1-249-421-11	CARBON 2.2K 5% 1/4W	
<u>TRANSISTOR</u>				R223	1-249-405-11	CARBON 100 5% 1/4W	
Q101	8-729-103-19	TRANSISTOR 2SA1206-K1		R224	1-249-405-11	CARBON 100 5% 1/4W	
Q102	8-729-103-19	TRANSISTOR 2SA1206-K1		R225	1-249-405-11	CARBON 100 5% 1/4W	
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1		R226	1-249-421-11	CARBON 2.2K 5% 1/4W	
Q200	8-729-178-54	TRANSISTOR 2SC2785		R227	1-215-393-00	METAL 68 1% 1/6W	
Q201	8-729-117-54	TRANSISTOR 2SA1175		R228	1-215-393-00	METAL 68 1% 1/6W	
Q202	8-729-117-54	TRANSISTOR 2SA1175		R229	1-249-405-11	CARBON 100 5% 1/4W	
Q203	8-729-103-19	TRANSISTOR 2SA1206-K1		R230	1-249-417-11	CARBON 1K 5% 1/4W	
Q204	8-729-378-84	TRANSISTOR 2SD788		R231	1-249-427-11	CARBON 6.8K 5% 1/4W	
Q301	8-729-378-84	TRANSISTOR 2SD788		R232	1-249-405-11	CARBON 100 5% 1/4W	
Q302	8-729-373-92	TRANSISTOR 2SB739		R233	1-249-435-11	CARBON 33K 5% 1/4W	
Q303	8-729-378-84	TRANSISTOR 2SD788		R234	1-249-421-11	CARBON 2.2K 5% 1/4W	
Q304	8-729-373-92	TRANSISTOR 2SB739		R235	1-249-417-11	CARBON 1K 5% 1/4W	
Q305	8-729-178-54	TRANSISTOR 2SC2785		R236	1-215-393-00	METAL 68 1% 1/6W	
Q306	8-729-378-84	TRANSISTOR 2SD788		R237	1-249-405-11	CARBON 100 5% 1/4W	
Q307	8-729-373-92	TRANSISTOR 2SB739		R238	1-249-437-11	CARBON 47K 5% 1/4W	
<u>RESISTOR</u>				R239	1-249-437-11	CARBON 47K 5% 1/4W	
R100	1-249-405-11	CARBON 100 5% 1/4W		R240	1-249-437-11	CARBON 47K 5% 1/4W	
R101	1-249-437-11	CARBON 47K 5% 1/4W		R241	1-249-437-11	CARBON 47K 5% 1/4W	
R102	1-249-437-11	CARBON 47K 5% 1/4W		R242	1-249-437-11	CARBON 47K 5% 1/4W	
R103	1-249-437-11	CARBON 47K 5% 1/4W		R243	1-249-427-11	CARBON 6.8K 5% 1/4W	
R104	1-249-405-11	CARBON 100 5% 1/4W		R244	1-249-427-11	CARBON 6.8K 5% 1/4W	
R105	1-249-405-11	CARBON 100 5% 1/4W		R245	1-249-427-11	CARBON 6.8K 5% 1/4W	
R106	1-249-405-11	CARBON 100 5% 1/4W		R246	1-249-427-11	CARBON 6.8K 5% 1/4W	
R107	1-249-405-11	CARBON 100 5% 1/4W		R247	1-249-427-11	CARBON 6.8K 5% 1/4W	
R108	1-249-421-11	CARBON 2.2K 5% 1/4W		R248	1-249-427-11	CARBON 6.8K 5% 1/4W	
R109	1-215-393-00	METAL 68 1% 1/6W		R249	1-249-405-11	CARBON 100 5% 1/4W	
R110	1-249-405-11	CARBON 100 5% 1/4W		R250	1-249-405-11	CARBON 100 5% 1/4W	
R111	1-249-405-11	CARBON 100 5% 1/4W		R251	1-249-427-11	CARBON 6.8K 5% 1/4W	
R112	1-249-405-11	CARBON 100 5% 1/4W		R252	1-249-427-11	CARBON 6.8K 5% 1/4W	
				R253	1-249-427-11	CARBON 6.8K 5% 1/4W	
				R254	1-249-427-11	CARBON 6.8K 5% 1/4W	
				R255	1-249-437-11	CARBON 47K 5% 1/4W	
				R256	1-249-437-11	CARBON 47K 5% 1/4W	
				R257	1-249-437-11	CARBON 47K 5% 1/4W	
				R258	1-249-437-11	CARBON 47K 5% 1/4W	

7. ELECTRICAL PARTS LIST

7-4

The components identified by shading and mark **A** are critical for safety.
Replace only with part number specified.

Les composants identifiés par une trame et une marque **A** sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

BD **P** **F**

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R109	1-215-411-00	METAL	390 1% 1/6W	R241	1-214-702-00	METAL	75 1% 1/4W
R110	1-249-405-11	CARBON	100 5% 1/4W	R242	1-249-399-11	CARBON	33 5% 1/4W
R111	1-215-411-00	METAL	390 1% 1/6W	R244	1-249-429-11	CARBON	10K 5% 1/4W
R112	1-249-405-11	CARBON	100 5% 1/4W	R245	1-249-393-11	CARBON	10 5% 1/4W
R113	1-249-421-11	CARBON	2.2K 5% 1/4W	R246	1-247-903-00	CARBON	1M 5% 1/4W
R116	1-249-417-11	CARBON	1K 5% 1/4W	R248	1-249-405-11	CARBON	100 5% 1/4W
R117	1-247-846-11	CARBON	4.3K 5% 1/4W	R249	1-249-441-11	CARBON	100K 5% 1/4W
R118	1-249-435-11	CARBON	33K 5% 1/4W	R301	1-249-405-11	CARBON	100 5% 1/4W
R122	1-249-405-11	CARBON	100 5% 1/4W	R302	1-249-433-11	CARBON	22K 5% 1/4W
R123	1-249-429-11	CARBON	10K 5% 1/4W	R303	1-215-413-00	METAL	470 1% 1/6W
R124	1-247-903-00	CARBON	1M 5% 1/4W	R304	1-215-429-00	METAL	2.2K 1% 1/6W
R125	1-249-405-11	CARBON	100 5% 1/4W	R305	1-215-429-00	METAL	2.2K 1% 1/6W
R126	1-215-419-00	METAL	820 1% 1/6W	R306	1-249-405-11	CARBON	100 5% 1/4W
R127	1-215-409-00	METAL	330 1% 1/6W	R307	1-215-415-00	METAL	560 1% 1/6W
R128	1-215-429-00	METAL	2.2K 1% 1/6W	R308	1-249-405-11	CARBON	100 5% 1/4W
R129	1-215-429-00	METAL	2.2K 1% 1/6W	R309	1-215-411-00	METAL	390 1% 1/6W
R131	1-215-445-00	METAL	10K 1% 1/6W	R310	1-249-405-11	CARBON	100 5% 1/4W
R132	1-215-409-00	METAL	330 1% 1/6W	R311	1-215-411-00	METAL	390 1% 1/6W
R133	1-215-423-00	METAL	1.2K 1% 1/6W	R312	1-249-405-11	CARBON	100 5% 1/4W
R134	1-215-445-00	METAL	10K 1% 1/6W	R313	1-249-421-11	CARBON	2.2K 5% 1/4W
R135	1-215-428-00	METAL	2K 1% 1/6W	R316	1-249-417-11	CARBON	1K 5% 1/4W
R136	1-215-445-00	METAL	10K 1% 1/6W	R317	1-247-846-11	CARBON	4.3K 5% 1/4W
R138	1-215-449-00	METAL	15K 1% 1/6W	R318	1-249-435-11	CARBON	33K 5% 1/4W
R139	1-215-421-00	METAL	1K 1% 1/6W	R322	1-249-405-11	CARBON	100 5% 1/4W
R140	1-215-441-00	METAL	6.8K 1% 1/6W	R323	1-249-429-11	CARBON	10K 5% 1/4W
R141	1-214-702-00	METAL	75 1% 1/4W	R324	1-247-903-00	CARBON	1M 5% 1/4W
R142	1-249-399-11	CARBON	33 5% 1/4W	R325	1-249-405-11	CARBON	100 5% 1/4W
R144	1-249-429-11	CARBON	10K 5% 1/4W	R326	1-215-419-00	METAL	820 1% 1/6W
R145	1-249-393-11	CARBON	10 5% 1/4W	R327	1-215-409-00	METAL	330 1% 1/6W
R146	1-247-903-00	CARBON	1M 5% 1/4W	R328	1-215-429-00	METAL	2.2K 1% 1/6W
R148	1-249-405-11	CARBON	100 5% 1/4W	R329	1-215-429-00	METAL	2.2K 1% 1/6W
R149	1-249-441-11	CARBON	100K 5% 1/4W	R331	1-215-445-00	METAL	10K 1% 1/6W
R201	1-249-405-11	CARBON	100 5% 1/4W	R332	1-215-409-00	METAL	330 1% 1/6W
R202	1-249-433-11	CARBON	22K 5% 1/4W	R333	1-215-423-00	METAL	1.2K 1% 1/6W
R203	1-215-413-00	METAL	470 1% 1/6W	R334	1-215-445-00	METAL	10K 1% 1/6W
R204	1-215-429-00	METAL	2.2K 1% 1/6W	R335	1-215-428-00	METAL	2K 1% 1/6W
R205	1-215-429-00	METAL	2.2K 1% 1/6W	R336	1-215-445-00	METAL	10K 1% 1/6W
R206	1-249-405-11	CARBON	100 5% 1/4W	R338	1-215-449-00	METAL	15K 1% 1/6W
R207	1-215-415-00	METAL	560 1% 1/6W	R339	1-215-421-00	METAL	1K 1% 1/6W
R208	1-249-405-11	CARBON	100 5% 1/4W	R340	1-215-441-00	METAL	6.8K 1% 1/6W
R209	1-215-411-00	METAL	390 1% 1/6W	R341	1-214-702-00	METAL	75 1% 1/4W
R210	1-249-405-11	CARBON	100 5% 1/4W	R342	1-249-399-11	CARBON	33 5% 1/4W
R211	1-215-411-00	METAL	390 1% 1/6W	R344	1-249-429-11	CARBON	10K 5% 1/4W
R212	1-249-405-11	CARBON	100 5% 1/4W	R345	1-249-393-11	CARBON	10 5% 1/4W
R213	1-249-421-11	CARBON	2.2K 5% 1/4W	R346	1-247-903-00	CARBON	1M 5% 1/4W
R216	1-249-417-11	CARBON	1K 5% 1/4W	R348	1-249-405-11	CARBON	100 5% 1/4W
R217	1-247-846-11	CARBON	4.3K 5% 1/4W	R349	1-249-441-11	CARBON	100K 5% 1/4W
R218	1-249-435-11	CARBON	33K 5% 1/4W	*****			
R222	1-249-405-11	CARBON	100 5% 1/4W	*1-617-480-11 P BOARD			
R223	1-249-429-11	CARBON	10K 5% 1/4W	*****			
R224	1-247-903-00	CARBON	1M 5% 1/4W	CONNECTOR			
R225	1-249-405-11	CARBON	100 5% 1/4W	P1 *1-508-768-00 PIN, CONNECTOR (5MM PITCH) 6P			
R226	1-215-419-00	METAL	820 1% 1/6W	*****			
R227	1-215-409-00	METAL	330 1% 1/6W	*1-619-844-11 F BOARD			
R228	1-215-429-00	METAL	2.2K 1% 1/6W	*****			
R229	1-215-429-00	METAL	2.2K 1% 1/6W	CAPACITOR			
R231	1-215-445-00	METAL	10K 1% 1/6W	C1 A.1-130-712-11 FILM 0.47MF 20% 250V			
R232	1-215-409-00	METAL	330 1% 1/6W	C2 A.1-161-742-51 CERAMIC 0.0022MF 20% 400V			
R233	1-215-423-00	METAL	1.2K 1% 1/6W				
R234	1-215-445-00	METAL	10K 1% 1/6W				
R235	1-215-428-00	METAL	2K 1% 1/6W				
R236	1-215-445-00	METAL	10K 1% 1/6W				
R238	1-215-449-00	METAL	15K 1% 1/6W				
R239	1-215-421-00	METAL	1K 1% 1/6W				
R240	1-215-441-00	METAL	6.8K 1% 1/6W				

F

QA

Les composants identifiés par
une trame et une marque Δ
sont critiques pour la sécurité.
Ne les remplacer que par une
pièce portant le numéro spécifique.

The components identified by
shading and mark Δ are critical
for safety.
Replace only with part number
specified.

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
C3	Δ 1-161-742-51	CERAMIC	0.0022MF 20% 400V	*A-1275-089-A	QA BOARD, COMPLETE		
C4	Δ 1-161-742-51	CERAMIC	0.0022MF 20% 400V		*****		
C5	Δ 1-161-742-51	CERAMIC	0.0022MF 20% 400V	1-537-174-11	TERMINAL BOARD, INPUT/OUTPUT		
C6	Δ 1-130-711-11	FILM	0.22MF 20% 250V				
C7	Δ 1-161-953-51	CERAMIC	0.0047MF 20% 400V				
C8	Δ 1-161-953-51	CERAMIC	0.0047MF 20% 400V				
C9	Δ 1-161-953-51	CERAMIC	0.0047MF 20% 400V				
C10	Δ 1-161-953-51	CERAMIC	0.0047MF 20% 400V				
C11	1-125-538-11	ELECT(BLOCK)	1000MF 20% 200V				
C12	1-125-538-11	ELECT(BLOCK)	1000MF 20% 200V				
C13	1-108-694-81	MYLAR	0.015MF 10% 200V				
C14	1-123-379-00	ELECT	0.47MF 20% 50V				
		DIODE					
D1	8-719-003-08	THYRISTOR CR3CM-8					
D2	Δ 8-719-300-07	DIODE RB406N					
		CONNECTOR					
F1	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P					
F2	*1-506-348-XX	PIN, CONNECTOR 3P					
F3	*1-506-371-00	PIN, CONNECTOR 2P					
F4	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P					
F5	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P					
F6	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P					
F7	*1-566-054-11	PIN, CONNECTOR 2P					
F8	*1-506-348-XX	PIN, CONNECTOR 3P					
F9	*1-506-348-XX	PIN, CONNECTOR 3P					
F10	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P					
F12	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P					
		NEON LAMP					
NL1	1-519-331-11	LAMP, NEON 3P					
		RESISTOR					
R1	Δ 1-202-730-91	SOLID	8.2M 10% 1/2W				
R2	Δ 1-202-845-91	SOLID	390K 10% 1/2W				
R3	Δ 1-217-295-11	WIREWOUND	5.6 10% 5W F				
R4	1-249-465-11	CARBON	47K 5% 1/4W				
R5	1-249-492-11	CARBON	47K 5% 1/2W				
R6	1-249-465-11	CARBON	47K 5% 1/4W				
R7	1-217-337-00	WIREWOUND	22 10% 7W F				
R8	1-247-717-11	CARBON	2.2K 5% 1/4W				
R9	1-247-713-11	CARBON	1K 5% 1/4W				
R10	1-217-337-00	WIREWOUND	22 10% 7W F				
		RELAY					
RY1	Δ 1-515-491-11	RELAY (POWER)					
		TRANSFORMER					
T1	Δ 1-421-590-11	TRANSFORMER, LINE FILTER					
T2	Δ 1-421-590-11	TRANSFORMER, LINE FILTER					
		THERMISTOR					
TH1	Δ 1-800-416-11	THERMISTOR					
TH2	Δ 1-800-416-11	THERMISTOR					
THP1	Δ 1-800-686-32	THERMISTOR (POSITIVE)					
THP2	Δ 1-806-387-11	THERMISTOR (POSITIVE)					
		CAPACITOR					
C101	1-161-021-11	CERAMIC	0.047MF 10% 25V				
C102	1-124-631-11	ELECT	47MF 20% 16V				
C103	1-101-004-00	CERAMIC	0.01MF 50V				
C104	1-123-332-00	ELECT	47MF 20% 16V				
C105	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C106	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C107	1-161-021-11	CERAMIC	0.047MF 10% 25V				
C108	1-124-631-11	ELECT	47MF 20% 16V				
C109	1-101-004-00	CERAMIC	0.01MF 50V				
C110	1-123-332-00	ELECT	47MF 20% 16V				
C111	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C112	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C113	1-161-021-11	CERAMIC	0.047MF 10% 25V				
C114	1-124-631-11	ELECT	47MF 20% 16V				
C115	1-101-004-00	CERAMIC	0.01MF 50V				
C116	1-123-332-00	ELECT	47MF 20% 16V				
C117	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C118	1-102-934-00	CERAMIC	1PF 0.25PF 50V				
C128	1-124-963-11	ELECT	33MF 20% 16V				
C129	1-101-004-00	CERAMIC	0.01MF 50V				
C130	1-101-004-00	CERAMIC	0.01MF 50V				
C131	1-124-963-11	ELECT	33MF 20% 16V				
C132	1-124-963-11	ELECT	33MF 20% 16V				
C133	1-101-004-00	CERAMIC	0.01MF 50V				
C134	1-101-004-00	CERAMIC	0.01MF 50V				
C135	1-124-963-11	ELECT	33MF 20% 16V				
C136	1-124-963-11	ELECT	33MF 20% 16V				
C137	1-101-004-00	CERAMIC	0.01MF 50V				
C138	1-101-004-00	CERAMIC	0.01MF 50V				
C139	1-124-963-11	ELECT	33MF 20% 16V				
		TRIMMER					
CV101	1-141-178-00	CAP, TRIMMER					
CV102	1-141-178-00	CAP, TRIMMER					
CV103	1-141-178-00	CAP, TRIMMER					
		TRANSISTOR					
Q101	8-729-105-88	TRANSISTOR 2SC2570A					
Q102	8-729-105-88	TRANSISTOR 2SC2570A					
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1					
Q104	8-729-105-88	TRANSISTOR 2SC2570A					
Q105	8-729-105-88	TRANSISTOR 2SC2570A					
Q106	8-729-105-88	TRANSISTOR 2SC2570A					
Q107	8-729-105-88	TRANSISTOR 2SC2570A					
Q108	8-729-103-19	TRANSISTOR 2SA1206-K1					
Q109	8-729-105-88	TRANSISTOR 2SC2570A					
Q110	8-729-105-88	TRANSISTOR 2SC2570A					
Q111	8-729-105-88	TRANSISTOR 2SC2570A					
Q112	8-729-105-88	TRANSISTOR 2SC2570A					
Q113	8-729-103-19	TRANSISTOR 2SA1206-K1					
Q114	8-729-105-88	TRANSISTOR 2SC2570A					
Q115	8-729-105-88	TRANSISTOR 2SC2570A					
		CONNECTOR					
QA1	*1-564-464-11	CONNECTOR (LIGHT ANGLE) 15P					



Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
RESISTOR				CAPACITOR			
R101	1-249-417-11	CARBON	1K 5% 1/4W	C101	1-161-021-11	CERAMIC	0.047MF 10% 25V
R102	1-249-417-11	CARBON	1K 5% 1/4W	C102	1-124-631-11	ELECT	47MF 20% 16V
R103	1-215-440-00	METAL	6.2K 1% 1/6W	C103	1-101-004-00	CERAMIC	0.01MF 50V
R104	1-215-447-00	METAL	12K 1% 1/6W	C104	1-123-332-00	ELECT	47MF 20% 16V
R105	1-215-445-00	METAL	10K 1% 1/6W	C105	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R106	1-215-448-00	METAL	13K 1% 1/6W	C106	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R107	1-215-429-00	METAL	2.2K 1% 1/6W	C107	1-161-021-11	CERAMIC	0.047MF 10% 25V
R108	1-215-421-00	METAL	1K 1% 1/6W	C108	1-124-631-11	ELECT	47MF 20% 16V
R109	1-215-437-00	METAL	4.7K 1% 1/6W	C109	1-101-004-00	CERAMIC	0.01MF 50V
R110	1-249-405-11	CARBON	100 5% 1/4W	C110	1-123-332-00	ELECT	47MF 20% 16V
R111	1-215-397-00	METAL	100 1% 1/6W	C111	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R112	1-249-420-11	CARBON	1.8K 5% 1/4W	C112	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R113	1-215-421-00	METAL	1K 1% 1/6W	C113	1-161-021-11	CERAMIC	0.047MF 10% 25V
R114	1-249-417-11	CARBON	1K 5% 1/4W	C114	1-124-631-11	ELECT	47MF 20% 16V
R115	1-249-417-11	CARBON	1K 5% 1/4W	C115	1-101-004-00	CERAMIC	0.01MF 50V
R116	1-215-440-00	METAL	6.2K 1% 1/6W	C116	1-123-332-00	ELECT	47MF 20% 16V
R117	1-215-447-00	METAL	12K 1% 1/6W	C117	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R118	1-215-445-00	METAL	10K 1% 1/6W	C118	1-102-934-00	CERAMIC	1PF 0.25PF 50V
R119	1-215-448-00	METAL	13K 1% 1/6W	C128	1-124-963-11	ELECT	33MF 20% 16V
R120	1-215-429-00	METAL	2.2K 1% 1/6W	C129	1-101-004-00	CERAMIC	0.01MF 50V
R121	1-215-421-00	METAL	1K 1% 1/6W	C130	1-101-004-00	CERAMIC	0.01MF 50V
R122	1-215-437-00	METAL	4.7K 1% 1/6W	C131	1-124-963-11	ELECT	33MF 20% 16V
R123	1-249-405-11	CARBON	100 5% 1/4W	C132	1-124-963-11	ELECT	33MF 20% 16V
R124	1-215-397-00	METAL	100 1% 1/6W	C133	1-101-004-00	CERAMIC	0.01MF 50V
R125	1-249-420-11	CARBON	1.8K 5% 1/4W	C134	1-101-004-00	CERAMIC	0.01MF 50V
R126	1-215-421-00	METAL	1K 1% 1/6W	C135	1-124-963-11	ELECT	33MF 20% 16V
R127	1-249-417-11	CARBON	1K 5% 1/4W	C136	1-124-963-11	ELECT	33MF 20% 16V
R128	1-249-417-11	CARBON	1K 5% 1/4W	C137	1-101-004-00	CERAMIC	0.01MF 50V
R129	1-215-440-00	METAL	6.2K 1% 1/6W	C138	1-101-004-00	CERAMIC	0.01MF 50V
R130	1-215-447-00	METAL	12K 1% 1/6W	C139	1-124-963-11	ELECT	33MF 20% 16V
R131	1-215-445-00	METAL	10K 1% 1/6W	TRIMMER			
R132	1-215-448-00	METAL	13K 1% 1/6W	CV101	1-141-178-00	CAP, TRIMMER	
R133	1-215-429-00	METAL	2.2K 1% 1/6W	CV102	1-141-178-00	CAP, TRIMMER	
R134	1-215-421-00	METAL	1K 1% 1/6W	CV103	1-141-178-00	CAP, TRIMMER	
R135	1-215-437-00	METAL	4.7K 1% 1/6W	TRANSISTOR			
R136	1-249-405-11	CARBON	100 5% 1/4W	Q101	8-729-105-88	TRANSISTOR 2SC2570A	
R137	1-215-397-00	METAL	100 1% 1/6W	Q102	8-729-105-88	TRANSISTOR 2SC2570A	
R138	1-249-420-11	CARBON	1.8K 5% 1/4W	Q103	8-729-103-19	TRANSISTOR 2SA1206-K1	
R139	1-215-421-00	METAL	1K 1% 1/6W	Q104	8-729-105-88	TRANSISTOR 2SC2570A	
R140	1-249-405-11	CARBON	100 5% 1/4W	Q105	8-729-105-88	TRANSISTOR 2SC2570A	
R141	1-249-405-11	CARBON	100 5% 1/4W	Q106	8-729-105-88	TRANSISTOR 2SC2570A	
R142	1-249-405-11	CARBON	100 5% 1/4W	Q107	8-729-105-88	TRANSISTOR 2SC2570A	
R143	1-249-405-11	CARBON	100 5% 1/4W	Q108	8-729-103-19	TRANSISTOR 2SA1206-K1	
R144	1-249-405-11	CARBON	100 5% 1/4W	Q109	8-729-105-88	TRANSISTOR 2SC2570A	
R145	1-249-405-11	CARBON	100 5% 1/4W	Q110	8-729-105-88	TRANSISTOR 2SC2570A	
R146	1-247-804-11	CARBON	75 5% 1/4W	Q111	8-729-105-88	TRANSISTOR 2SC2570A	
R147	1-247-804-11	CARBON	75 5% 1/4W	Q112	8-729-105-88	TRANSISTOR 2SC2570A	
R148	1-247-804-11	CARBON	75 5% 1/4W	Q113	8-729-103-19	TRANSISTOR 2SA1206-K1	
VARIABLE RESISTOR				Q114	8-729-105-88	TRANSISTOR 2SC2570A	
RV101	1-237-516-21	RES, ADJ, CERMET 2K		Q115	8-729-105-88	TRANSISTOR 2SC2570A	
RV102	1-237-516-21	RES, ADJ, CERMET 2K		CONNECTOR			
RV103	1-237-516-21	RES, ADJ, CERMET 2K		QB1	*1-564-464-11	CONNECTOR (LIGHT ANGLE) 15P	
*****				RESISTOR			
*A-1275-090-A QB BOARD, COMPLETE				R101	1-249-417-11	CARBON	1K 5% 1/4W
*****				R102	1-249-417-11	CARBON	1K 5% 1/4W
1-537-174-21 TERMINAL BOARD, INPUT/OUTPUT							

7-8

7-9

N BN BC

Ref.No.	Part No.	Description	Remark
R30	1-249-429-11	CARBON 10K 5% 1/4W	
R33	1-249-401-11	CARBON 47 5% 1/4W	
R36	1-249-401-11	CARBON 47 5% 1/4W	
R37	1-249-425-11	CARBON 4.7K 5% 1/4W	
R38	1-249-401-11	CARBON 47 5% 1/4W	
R39	1-249-429-11	CARBON 10K 5% 1/4W	
R40	1-249-429-11	CARBON 10K 5% 1/4W	
R41	1-249-429-11	CARBON 10K 5% 1/4W	
R42	1-249-417-11	CARBON 1K 5% 1/4W	
R43	1-249-417-11	CARBON 1K 5% 1/4W	
R44	1-249-417-11	CARBON 1K 5% 1/4W	

VARIABLE RESISTOR

RV3	1-228-594-00	RES, VAR, CARBON 10K	
RV4	1-224-940-00	RES, ADJ, CERMET 10K	

SWITCH

S2	1-570-101-41	SWITCH, KEY BOARD	
S3	1-570-101-41	SWITCH, KEY BOARD	
S4	1-570-101-41	SWITCH, KEY BOARD	
S5	1-570-101-41	SWITCH, KEY BOARD	
S6	1-570-101-41	SWITCH, KEY BOARD	
S7	1-570-101-41	SWITCH, KEY BOARD	
S8	1-570-101-41	SWITCH, KEY BOARD	
S9	1-570-101-41	SWITCH, KEY BOARD	
S10	1-570-101-41	SWITCH, KEY BOARD	
S11	1-570-101-41	SWITCH, KEY BOARD	
S12	1-570-101-41	SWITCH, KEY BOARD	
S13	1-570-101-41	SWITCH, KEY BOARD	
S14	1-570-101-41	SWITCH, KEY BOARD	
S15	1-570-101-41	SWITCH, KEY BOARD	
S16	1-570-101-41	SWITCH, KEY BOARD	
S17	1-570-101-41	SWITCH, KEY BOARD	

TRANSFORMER

T1	1-448-704-11	TRANSFORMER, CONVERTER	
----	--------------	------------------------	--

CRYSTAL

X1	1-527-828-00	OSCILLATOR, CRYSTAL	
----	--------------	---------------------	--

*1-626-497-11 BN BOARD

4-378-915-01 NUT (M2.6), PLATE

CONNECTOR

BN1	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN2	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN3	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN4	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN5	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN6	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN7	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
BN8	*1-566-045-11	PIN, CONNECTOR 6P	
BN9	*1-566-046-11	PIN, CONNECTOR 7P	
BN10	*1-566-047-11	PIN, CONNECTOR 8P	
BN11	*1-566-054-11	PIN, CONNECTOR 2P	
BN12	*1-566-057-11	PIN, CONNECTOR 5P	

Ref.No.	Part No.	Description	Remark
BN13	*1-566-060-11	PIN, CONNECTOR 8P	
BN14	*1-566-056-11	PIN, CONNECTOR 4P	
BN15	*1-566-058-11	PIN, CONNECTOR 6P	
BN16	*1-566-062-11	PIN, CONNECTOR 10P	
BN17	*1-566-054-11	PIN, CONNECTOR 2P	
BN18	*1-566-055-11	PIN, CONNECTOR 3P	
BN19	*1-566-047-11	PIN, CONNECTOR 8P	
BN20	*1-566-047-11	PIN, CONNECTOR 8P	
BN21	*1-566-058-11	PIN, CONNECTOR 6P	
BN22	*1-566-054-11	PIN, CONNECTOR 2P	
BN23	*1-566-055-11	PIN, CONNECTOR 3P	
BN24	*1-566-056-11	PIN, CONNECTOR 4P	

JACK

BNJ1	1-507-751-00	JACK, PIN 1P	
BNJ2	1-507-751-00	JACK, PIN 1P	
BNJ3	1-507-751-00	JACK, PIN 1P	

*A-1296-194-A BC BOARD, COMPLETE

*4-353-708-00 HOOK, FINGER
4-378-915-01 NUT (M2.6), PLATE (N1,N2)

CONNECTOR

BC1	*1-562-729-11	CONNECTOR, MULTI 64P	
-----	---------------	----------------------	--

CAPACITOR

C1	1-101-004-00	CERAMIC	0.01MF	50V
C2	1-101-004-00	CERAMIC	0.01MF	50V
C3	1-101-004-00	CERAMIC	0.01MF	50V
C4	1-101-004-00	CERAMIC	0.01MF	50V
C5	1-124-477-11	ELECT	47MF	20% 25V
C6	1-124-477-11	ELECT	47MF	20% 25V
C7	1-126-103-11	ELECT	47OMF	20% 16V
C8	1-126-103-11	ELECT	47OMF	20% 16V
C9	1-124-477-11	ELECT	47MF	20% 25V
C10	1-124-477-11	ELECT	47MF	20% 25V
C11	1-124-477-11	ELECT	47MF	20% 25V
C12	1-124-477-11	ELECT	47MF	20% 25V
C13	1-101-004-00	CERAMIC	0.01MF	50V
C14	1-101-004-00	CERAMIC	0.01MF	50V
C15	1-124-478-11	ELECT	100MF	20% 25V
C16	1-124-478-11	ELECT	100MF	20% 25V
C17	1-124-478-11	ELECT	100MF	20% 25V
C18	1-124-478-11	ELECT	100MF	20% 25V
C19	1-101-004-00	CERAMIC	0.01MF	50V
C20	1-101-004-00	CERAMIC	0.01MF	50V
C101	1-102-973-00	CERAMIC	100PF	5% 50V
C102	1-102-973-00	CERAMIC	100PF	5% 50V
C103	1-102-959-00	CERAMIC	22PF	10% 50V
C104	1-101-004-00	CERAMIC	0.01MF	50V
C105	1-101-004-00	CERAMIC	0.01MF	50V
C106	1-124-477-11	ELECT	47MF	20% 25V
C107	1-101-004-00	CERAMIC	0.01MF	50V
C108	1-101-004-00	CERAMIC	0.01MF	50V
C109	1-102-973-00	CERAMIC	100PF	5% 50V
C110	1-124-478-11	ELECT	100MF	20% 25V
C111	1-101-004-00	CERAMIC	0.01MF	50V
C112	1-124-477-11	ELECT	47MF	20% 25V
C113	1-124-477-11	ELECT	47MF	20% 25V

Ref.No.	Part No.	Description		Remark	Ref.No.	Part No.	Description	Remark
C114	1-102-816-00	CERAMIC	120PF	5%	50V			
C115	1-101-004-00	CERAMIC	0.01MF		50V		DIODE	
C116	1-101-004-00	CERAMIC	0.01MF		50V			
C117	1-124-477-11	ELECT	47MF	20%	25V	D1	8-719-815-55	DIODE 1S1555
C119	1-102-953-00	CERAMIC	18PF	5%	50V	D2	8-719-815-55	DIODE 1S1555
C120	1-124-478-11	ELECT	100MF	20%	25V	D3	8-719-815-55	DIODE 1S1555
C121	1-101-004-00	CERAMIC	0.01MF		50V	D4	8-719-815-55	DIODE 1S1555
C122	1-124-477-11	ELECT	47MF	20%	25V	D5	8-719-100-44	DIODE RD7.5E-B2
C123	1-124-477-11	ELECT	47MF	20%	25V	D101	8-719-815-55	DIODE 1S1555
C125	1-101-004-00	CERAMIC	0.01MF		50V	D102	8-719-815-55	DIODE 1S1555
C126	1-101-004-00	CERAMIC	0.01MF		50V	D103	8-719-911-19	DIODE 1SS119
C127	1-124-478-11	ELECT	100MF	20%	25V	D201	8-719-815-55	DIODE 1S1555
C128	1-124-478-11	ELECT	100MF	20%	25V	D202	8-719-815-55	DIODE 1S1555
C201	1-102-973-00	CERAMIC	100PF	5%	50V	D203	8-719-911-19	DIODE 1SS119
C202	1-102-973-00	CERAMIC	100PF	5%	50V	D301	8-719-815-55	DIODE 1S1555
C203	1-102-959-00	CERAMIC	22PF	10%	50V	D302	8-719-815-55	DIODE 1S1555
C204	1-101-004-00	CERAMIC	0.01MF		50V	D303	8-719-911-19	DIODE 1SS119
C205	1-101-004-00	CERAMIC	0.01MF		50V			
C206	1-124-477-11	ELECT	47MF	20%	25V		IC	
C207	1-101-004-00	CERAMIC	0.01MF		50V	IC1	8-759-910-83	IC TL072ACP
C208	1-101-004-00	CERAMIC	0.01MF		50V	IC2	8-759-910-83	IC TL072ACP
C209	1-102-973-00	CERAMIC	100PF	5%	50V	IC3	8-757-182-14	IC CX-718D
C210	1-124-478-11	ELECT	100MF	20%	25V	IC4	8-759-400-29	IC AN78L04
C211	1-101-004-00	CERAMIC	0.01MF		50V	IC7	8-759-400-29	IC AN78L04
C212	1-124-477-11	ELECT	47MF	20%	25V	IC8	8-759-700-67	IC NJM79L08A
C213	1-124-477-11	ELECT	47MF	20%	25V	IC101	8-759-910-83	IC TL072ACP
C214	1-102-816-00	CERAMIC	120PF	5%	50V	IC102	8-759-910-83	IC TL072ACP
C215	1-101-004-00	CERAMIC	0.01MF		50V	IC103	8-741-131-30	IC BX1313
C216	1-101-004-00	CERAMIC	0.01MF		50V	IC104	8-759-015-95	IC MC1595L
C217	1-124-477-11	ELECT	47MF	20%	25V	IC105	8-741-131-30	IC BX1313
C219	1-102-953-00	CERAMIC	18PF	5%	50V	IC106	8-759-800-81	IC LA7016
C220	1-124-478-11	ELECT	100MF	20%	25V	IC201	8-759-910-83	IC TL072ACP
C221	1-101-004-00	CERAMIC	0.01MF		50V	IC202	8-759-910-83	IC TL072ACP
C222	1-124-477-11	ELECT	47MF	20%	25V	IC203	8-741-131-30	IC BX1313
C223	1-124-477-11	ELECT	47MF	20%	25V	IC204	8-759-015-95	IC MC1595L
C225	1-101-004-00	CERAMIC	0.01MF		50V	IC205	8-741-131-30	IC BX1313
C226	1-101-004-00	CERAMIC	0.01MF		50V	IC206	8-759-800-81	IC LA7016
C227	1-124-478-11	ELECT	100MF	20%	25V	IC301	8-759-910-83	IC TL072ACP
C228	1-124-478-11	ELECT	100MF	20%	25V	IC302	8-759-910-83	IC TL072ACP
C301	1-102-973-00	CERAMIC	100PF	5%	50V	IC303	8-741-131-30	IC BX1313
C302	1-102-973-00	CERAMIC	100PF	5%	50V	IC304	8-759-015-95	IC MC1595L
C303	1-102-959-00	CERAMIC	22PF	10%	50V	IC305	8-741-131-30	IC BX1313
C304	1-101-004-00	CERAMIC	0.01MF		50V	IC306	8-759-800-81	IC LA7016
C305	1-101-004-00	CERAMIC	0.01MF		50V			
C306	1-124-477-11	ELECT	47MF	20%	25V		TRANSISTOR	
C307	1-101-004-00	CERAMIC	0.01MF		50V	Q1	8-729-600-60	TRANSISTOR 2SA1115P
C308	1-101-004-00	CERAMIC	0.01MF		50V	Q2	8-729-600-60	TRANSISTOR 2SA1115P
C309	1-102-973-00	CERAMIC	100PF	5%	50V	Q3	8-729-178-54	TRANSISTOR 2SC2785
C310	1-124-478-11	ELECT	100MF	20%	25V	Q101	8-729-103-19	TRANSISTOR 2SA1206-K1
C311	1-101-004-00	CERAMIC	0.01MF		50V	Q102	8-729-103-19	TRANSISTOR 2SA1206-K1
C312	1-124-477-11	ELECT	47MF	20%	25V	Q103	8-729-103-19	TRANSISTOR 2SA1206-K1
C313	1-124-477-11	ELECT	47MF	20%	25V	Q104	8-729-103-19	TRANSISTOR 2SA1206-K1
C314	1-102-816-00	CERAMIC	120PF	5%	50V	Q105	8-729-105-47	TRANSISTOR 2SC2026-L
C315	1-101-004-00	CERAMIC	0.01MF		50V	Q201	8-729-103-19	TRANSISTOR 2SA1206-K1
C316	1-101-004-00	CERAMIC	0.01MF		50V	Q202	8-729-103-19	TRANSISTOR 2SA1206-K1
C317	1-124-477-11	ELECT	47MF	20%	25V	Q203	8-729-103-19	TRANSISTOR 2SA1206-K1
C319	1-102-953-00	CERAMIC	18PF	5%	50V	Q204	8-729-103-19	TRANSISTOR 2SA1206-K1
C320	1-124-478-11	ELECT	100MF	20%	25V	Q205	8-729-105-47	TRANSISTOR 2SC2026-L
C321	1-101-004-00	CERAMIC	0.01MF		50V	Q301	8-729-103-19	TRANSISTOR 2SA1206-K1
C322	1-124-477-11	ELECT	47MF	20%	25V	Q302	8-729-103-19	TRANSISTOR 2SA1206-K1
C323	1-124-477-11	ELECT	47MF	20%	25V	Q303	8-729-103-19	TRANSISTOR 2SA1206-K1
C325	1-101-004-00	CERAMIC	0.01MF		50V	Q304	8-729-103-19	TRANSISTOR 2SA1206-K1
C326	1-101-004-00	CERAMIC	0.01MF		50V	Q305	8-729-105-47	TRANSISTOR 2SC2026-L
C327	1-124-478-11	ELECT	100MF	20%	25V			
C328	1-124-478-11	ELECT	100MF	20%	25V			

BC

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
RESISTOR				R140	1-249-385-11	CARBON	2.2 5% 1/4W
R7	1-249-405-11	CARBON	100 5% 1/4W	R141	1-249-385-11	CARBON	2.2 5% 1/4W
R8	1-249-425-11	CARBON	4.7K 5% 1/4W	R142	1-249-405-11	CARBON	100 5% 1/4W
R9	1-249-405-11	CARBON	100 5% 1/4W	R143	1-249-423-11	CARBON	3.3K 5% 1/4W
R10	1-249-405-11	CARBON	100 5% 1/4W	R144	1-249-405-11	CARBON	100 5% 1/4W
R11	1-249-405-11	CARBON	100 5% 1/4W	R145	1-249-405-11	CARBON	100 5% 1/4W
R12	1-249-409-11	CARBON	220 5% 1/4W	R146	1-249-425-11	CARBON	4.7K 5% 1/4W
R13	1-249-413-11	CARBON	470 5% 1/4W	R147	1-249-405-11	CARBON	100 5% 1/4W
R14	1-215-453-00	METAL	22K 1% 1/6W	R201	1-215-421-00	METAL	1K 1% 1/6W
R15	1-215-453-00	METAL	22K 1% 1/6W	R202	1-215-421-00	METAL	1K 1% 1/6W
R16	1-215-453-00	METAL	22K 1% 1/6W	R203	1-249-405-11	CARBON	100 5% 1/4W
R17	1-215-453-00	METAL	22K 1% 1/6W	R204	1-215-469-00	METAL	100K 1% 1/6W
R18	1-215-445-00	METAL	10K 1% 1/6W	R205	1-215-469-00	METAL	100K 1% 1/6W
R19	1-215-445-00	METAL	10K 1% 1/6W	R206	1-215-469-00	METAL	100K 1% 1/6W
R20	1-215-445-00	METAL	10K 1% 1/6W	R207	1-215-469-00	METAL	100K 1% 1/6W
R21	1-215-445-00	METAL	10K 1% 1/6W	R208	1-215-433-00	METAL	3.3K 1% 1/6W
R22	1-215-429-00	METAL	2.2K 1% 1/6W	R209	1-215-445-00	METAL	10K 1% 1/6W
R23	1-249-435-11	CARBON	33K 5% 1/4W	R210	1-215-445-00	METAL	10K 1% 1/6W
R24	1-249-429-11	CARBON	10K 5% 1/4W	R211	1-215-445-00	METAL	10K 1% 1/6W
R25	1-249-427-11	CARBON	6.8K 5% 1/4W	R212	1-215-445-00	METAL	10K 1% 1/6W
R26	1-249-423-11	CARBON	3.3K 5% 1/4W	R213	1-215-445-00	METAL	10K 1% 1/6W
R27	1-249-429-11	CARBON	10K 5% 1/4W	R214	1-249-413-11	CARBON	470 5% 1/4W
R28	1-249-421-11	CARBON	2.2K 5% 1/4W	R215	1-249-415-11	CARBON	680 5% 1/4W
R29	1-247-903-00	CARBON	1M 5% 1/4W	R216	1-249-417-11	CARBON	1K 5% 1/4W
R101	1-215-421-00	METAL	1K 1% 1/6W	R217	1-249-405-11	CARBON	100 5% 1/4W
R102	1-215-421-00	METAL	1K 1% 1/6W	R218	1-249-439-11	CARBON	68K 5% 1/4W
R103	1-249-405-11	CARBON	100 5% 1/4W	R219	1-249-429-11	CARBON	10K 5% 1/4W
R104	1-215-469-00	METAL	100K 1% 1/6W	R220	1-249-421-11	CARBON	2.2K 5% 1/4W
R105	1-215-469-00	METAL	100K 1% 1/6W	R221	1-249-405-11	CARBON	100 5% 1/4W
R106	1-215-469-00	METAL	100K 1% 1/6W	R222	1-215-457-00	METAL	33K 1% 1/6W
R107	1-215-469-00	METAL	100K 1% 1/6W	R223	1-215-407-00	METAL	270 1% 1/6W
R108	1-215-433-00	METAL	3.3K 1% 1/6W	R224	1-215-429-00	METAL	2.2K 1% 1/6W
R109	1-215-445-00	METAL	10K 1% 1/6W	R225	1-215-431-00	METAL	2.7K 1% 1/6W
R110	1-215-445-00	METAL	10K 1% 1/6W	R226	1-215-443-00	METAL	8.2K 1% 1/6W
R111	1-215-445-00	METAL	10K 1% 1/6W	R227	1-215-425-00	METAL	1.5K 1% 1/6W
R112	1-215-445-00	METAL	10K 1% 1/6W	R228	1-215-403-00	METAL	180 1% 1/6W
R113	1-215-445-00	METAL	10K 1% 1/6W	R229	1-215-403-00	METAL	180 1% 1/6W
R114	1-249-413-11	CARBON	470 5% 1/4W	R230	1-215-409-00	METAL	330 1% 1/6W
R115	1-249-415-11	CARBON	680 5% 1/4W	R231	1-215-409-00	METAL	330 1% 1/6W
R116	1-249-417-11	CARBON	1K 5% 1/4W	R232	1-215-457-00	METAL	33K 1% 1/6W
R117	1-249-405-11	CARBON	100 5% 1/4W	R233	1-215-415-00	METAL	560 1% 1/6W
R118	1-249-439-11	CARBON	68K 5% 1/4W	R234	1-215-417-00	METAL	680 1% 1/6W
R119	1-249-429-11	CARBON	10K 5% 1/4W	R235	1-249-439-11	CARBON	68K 5% 1/4W
R120	1-249-421-11	CARBON	2.2K 5% 1/4W	R236	1-249-405-11	CARBON	100 5% 1/4W
R121	1-249-405-11	CARBON	100 5% 1/4W	R237	1-249-429-11	CARBON	10K 5% 1/4W
R122	1-215-457-00	METAL	33K 1% 1/6W	R238	1-249-405-11	CARBON	100 5% 1/4W
R123	1-215-407-00	METAL	270 1% 1/6W	R239	1-249-421-11	CARBON	2.2K 5% 1/4W
R124	1-215-429-00	METAL	2.2K 1% 1/6W	R240	1-249-385-11	CARBON	2.2 5% 1/4W
R125	1-215-431-00	METAL	2.7K 1% 1/6W	R241	1-249-385-11	CARBON	2.2 5% 1/4W
R126	1-215-443-00	METAL	8.2K 1% 1/6W	R242	1-249-405-11	CARBON	100 5% 1/4W
R127	1-215-425-00	METAL	1.5K 1% 1/6W	R243	1-249-423-11	CARBON	3.3K 5% 1/4W
R128	1-215-403-00	METAL	180 1% 1/6W	R244	1-249-405-11	CARBON	100 5% 1/4W
R129	1-215-403-00	METAL	180 1% 1/6W	R245	1-249-405-11	CARBON	100 5% 1/4W
R130	1-215-409-00	METAL	330 1% 1/6W	R246	1-249-425-11	CARBON	4.7K 5% 1/4W
R131	1-215-409-00	METAL	330 1% 1/6W	R247	1-249-405-11	CARBON	100 5% 1/4W
R132	1-215-457-00	METAL	33K 1% 1/6W	R301	1-215-421-00	METAL	1K 1% 1/6W
R133	1-215-415-00	METAL	560 1% 1/6W	R302	1-215-421-00	METAL	1K 1% 1/6W
R134	1-215-417-00	METAL	680 1% 1/6W	R303	1-249-405-11	CARBON	100 5% 1/4W
R135	1-249-439-11	CARBON	68K 5% 1/4W	R304	1-215-469-00	METAL	100K 1% 1/6W
R136	1-249-405-11	CARBON	100 5% 1/4W	R305	1-215-469-00	METAL	100K 1% 1/6W
R137	1-249-429-11	CARBON	10K 5% 1/4W	R306	1-215-469-00	METAL	100K 1% 1/6W
R138	1-249-405-11	CARBON	100 5% 1/4W	R307	1-215-469-00	METAL	100K 1% 1/6W
R139	1-249-421-11	CARBON	2.2K 5% 1/4W	R308	1-215-433-00	METAL	3.3K 1% 1/6W
				R309	1-215-445-00	METAL	10K 1% 1/6W
				R310	1-215-445-00	METAL	10K 1% 1/6W

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R311	1-215-445-00	METAL 10K 1% 1/6W		C5	1-101-004-00	CERAMIC 0.01MF	50V
R312	1-215-445-00	METAL 10K 1% 1/6W		C6	1-124-499-11	ELECT 1MF	20% 50V
R313	1-215-445-00	METAL 10K 1% 1/6W		C7	1-101-004-00	CERAMIC 0.01MF	50V
R314	1-249-413-11	CARBON 470 5% 1/4W		C8	1-124-499-11	ELECT 1MF	20% 50V
R315	1-249-415-11	CARBON 680 5% 1/4W		C9	1-102-972-00	CERAMIC 91PF	5% 50V
R316	1-249-417-11	CARBON 1K 5% 1/4W		C10	1-101-004-00	CERAMIC 0.01MF	50V
R317	1-249-405-11	CARBON 100 5% 1/4W		C11	1-101-004-00	CERAMIC 0.01MF	50V
R318	1-249-439-11	CARBON 68K 5% 1/4W		C12	1-102-944-00	CERAMIC 7PF	1PF 50V
R319	1-249-429-11	CARBON 10K 5% 1/4W		C13	1-126-233-11	ELECT 22MF	20% 25V
R320	1-249-421-11	CARBON 2.2K 5% 1/4W		C14	1-101-004-00	CERAMIC 0.01MF	50V
R321	1-249-405-11	CARBON 100 5% 1/4W		C15	1-101-004-00	CERAMIC 0.01MF	50V
R322	1-215-457-00	METAL 33K 1% 1/6W		C16	1-101-888-00	CERAMIC 68PF	5% 50V
R323	1-215-407-00	METAL 270 1% 1/6W		C17	1-126-233-11	ELECT 22MF	20% 25V
R324	1-215-429-00	METAL 2.2K 1% 1/6W		C18	1-101-004-00	CERAMIC 0.01MF	50V
R325	1-215-431-00	METAL 2.7K 1% 1/6W		C19	1-101-004-00	CERAMIC 0.01MF	50V
R326	1-215-443-00	METAL 8.2K 1% 1/6W		C20	1-102-972-00	CERAMIC 91PF	5% 50V
R327	1-215-425-00	METAL 1.5K 1% 1/6W		C21	1-102-944-00	CERAMIC 7PF	1PF 50V
R328	1-215-403-00	METAL 180 1% 1/6W		C22	1-126-233-11	ELECT 22MF	20% 25V
R329	1-215-403-00	METAL 180 1% 1/6W		C23	1-101-004-00	CERAMIC 0.01MF	50V
R330	1-215-409-00	METAL 330 1% 1/6W		C24	1-101-888-00	CERAMIC 68PF	5% 50V
R331	1-215-409-00	METAL 330 1% 1/6W		C25	1-126-233-11	ELECT 22MF	20% 25V
R332	1-215-457-00	METAL 33K 1% 1/6W		C26	1-101-004-00	CERAMIC 0.01MF	50V
R333	1-215-415-00	METAL 560 1% 1/6W		C27	1-101-004-00	CERAMIC 0.01MF	50V
R334	1-215-417-00	METAL 680 1% 1/6W		C28	1-102-972-00	CERAMIC 91PF	5% 50V
R335	1-249-439-11	CARBON 68K 5% 1/4W		C29	1-102-944-00	CERAMIC 7PF	1PF 50V
R336	1-249-405-11	CARBON 100 5% 1/4W		C30	1-126-233-11	ELECT 22MF	20% 25V
R337	1-249-429-11	CARBON 10K 5% 1/4W		C31	1-102-935-00	CERAMIC 2PF	0.25PF 50V
R338	1-249-405-11	CARBON 100 5% 1/4W		C32	1-101-888-00	CERAMIC 68PF	5% 50V
R339	1-249-421-11	CARBON 2.2K 5% 1/4W		C33	1-126-233-11	ELECT 22MF	20% 25V
R340	1-249-385-11	CARBON 2.2 5% 1/4W		C34	1-124-277-11	ELECT 4.7MF	20% 35V
R341	1-249-385-11	CARBON 2.2 5% 1/4W		C35	1-124-478-11	ELECT 100MF	20% 25V
R342	1-249-405-11	CARBON 100 5% 1/4W		C36	1-126-233-11	ELECT 22MF	20% 25V
R343	1-249-423-11	CARBON 3.3K 5% 1/4W		C37	1-124-477-11	ELECT 47MF	20% 25V
R344	1-249-405-11	CARBON 100 5% 1/4W		C38	1-124-120-11	ELECT 220MF	20% 16V
R345	1-249-405-11	CARBON 100 5% 1/4W		C39	1-101-004-00	CERAMIC 0.01MF	50V
R346	1-249-425-11	CARBON 4.7K 5% 1/4W		C40	1-124-477-11	ELECT 47MF	20% 25V
R347	1-249-405-11	CARBON 100 5% 1/4W		C41	1-101-004-00	CERAMIC 0.01MF	50V
VARIABLE RESISTOR				C42	1-124-477-11	ELECT 47MF	20% 25V
RV1	1-237-515-21	RES, ADJ, CERMET 1K		C43	1-126-233-11	ELECT 22MF	20% 25V
RV101	1-237-515-21	RES, ADJ, CERMET 1K		C44	1-101-004-00	CERAMIC 0.01MF	50V
RV102	1-237-515-21	RES, ADJ, CERMET 1K		C45	1-124-477-11	ELECT 47MF	20% 25V
RV201	1-237-515-21	RES, ADJ, CERMET 1K		C46	1-123-321-00	ELECT 220MF	20% 16V
RV202	1-237-515-21	RES, ADJ, CERMET 1K		C47	1-101-004-00	CERAMIC 0.01MF	50V
RV301	1-237-515-21	RES, ADJ, CERMET 1K		C48	1-124-477-11	ELECT 47MF	20% 25V
RV302	1-237-515-21	RES, ADJ, CERMET 1K		C49	1-124-477-11	ELECT 47MF	20% 25V
*****				C50	1-101-004-00	CERAMIC 0.01MF	50V
*A-1296-450-A BB BOARD, COMPLETE				C51	1-124-477-11	ELECT 47MF	20% 25V
*****				C52	1-126-233-11	ELECT 22MF	20% 25V
*4-353-708-00 HOOK, FINGER				C53	1-101-004-00	CERAMIC 0.01MF	50V
				C54	1-124-477-11	ELECT 47MF	20% 25V
CONNECTOR				C55	1-101-004-00	CERAMIC 0.01MF	50V
BB1	*1-562-729-11	CONNECTOR, MULTI 64P		C56	1-126-233-11	ELECT 22MF	20% 25V
	4-378-915-01	NUT (M2.6), PLATE; BB1		C57	1-126-233-11	ELECT 22MF	20% 25V
CAPACITOR				C58	1-126-233-11	ELECT 22MF	20% 25V
C1	1-101-004-00	CERAMIC 0.01MF	50V	C59	1-126-233-11	ELECT 22MF	20% 25V
C2	1-124-499-11	ELECT 1MF	20% 50V	C60	1-126-233-11	ELECT 22MF	20% 25V
C3	1-101-888-00	CERAMIC 68PF	5% 50V	C61	1-126-233-11	ELECT 22MF	20% 25V
C4	1-126-233-11	ELECT 22MF	20% 25V	C62	1-126-233-11	ELECT 22MF	20% 25V
				C63	1-126-233-11	ELECT 22MF	20% 25V
				C64	1-126-233-11	ELECT 22MF	20% 25V
				C65	1-126-233-11	ELECT 22MF	20% 25V
				C66	1-126-233-11	ELECT 22MF	20% 25V
				C67	1-126-233-11	ELECT 22MF	20% 25V
				C68	1-126-233-11	ELECT 22MF	20% 25V
				C69	1-126-233-11	ELECT 22MF	20% 25V

BB

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
C70	1-126-233-11	ELECT 22MF	20% 25V	DL4	1-415-465-11	DELAY LINE	
C71	1-126-233-11	ELECT 22MF	20% 25V	DL5	1-415-465-11	DELAY LINE	
C72	1-126-233-11	ELECT 22MF	20% 25V	DL6	1-415-464-11	DELAY LINE	
C73	1-126-233-11	ELECT 22MF	20% 25V				
C74	1-126-233-11	ELECT 22MF	20% 25V				
					IC		
C75	1-126-233-11	ELECT 22MF	20% 25V	IC1	8-759-800-81	IC LA7016	
C76	1-101-004-00	CERAMIC 0.01MF	50V	IC2	8-759-800-81	IC LA7016	
C77	1-101-004-00	CERAMIC 0.01MF	50V	IC3	8-759-800-81	IC LA7016	
C78	1-101-004-00	CERAMIC 0.01MF	50V	IC4	8-741-119-00	IC BX1190	
C79	1-101-004-00	CERAMIC 0.01MF	50V	IC5	8-741-119-00	IC BX1190	
C80	1-101-004-00	CERAMIC 0.01MF	50V				
C81	1-101-004-00	CERAMIC 0.01MF	50V	IC6	8-759-800-81	IC LA7016	
C82	1-101-004-00	CERAMIC 0.01MF	50V	IC7	8-759-800-81	IC LA7016	
C83	1-101-004-00	CERAMIC 0.01MF	50V	IC8	8-759-800-81	IC LA7016	
C84	1-101-004-00	CERAMIC 0.01MF	50V	IC9	8-759-800-81	IC LA7016	
C85	1-101-004-00	CERAMIC 0.01MF	50V	IC10	8-759-800-81	IC LA7016	
C86	1-101-004-00	CERAMIC 0.01MF	50V				
C87	1-101-004-00	CERAMIC 0.01MF	50V	IC11	8-759-800-81	IC LA7016	
C88	1-101-004-00	CERAMIC 0.01MF	50V				
C89	1-101-004-00	CERAMIC 0.01MF	50V		JACK		
C90	1-101-004-00	CERAMIC 0.01MF	50V	J1	1-560-914-00	POST, CONNECTOR 2P	
C91	1-124-285-00	ELECT 22MF	20% 16V	J1	*1-561-724-00	SOCKET, CONNECTOR 2P	
C92	1-124-285-00	ELECT 22MF	20% 16V	J2	1-560-914-00	POST, CONNECTOR 2P	
C93	1-124-285-00	ELECT 22MF	20% 16V	J2	*1-561-724-00	SOCKET, CONNECTOR 2P	
C94	1-124-285-00	ELECT 22MF	20% 16V				
C95	1-124-285-00	ELECT 22MF	20% 16V		TRANSISTOR		
C96	1-124-285-00	ELECT 22MF	20% 16V	Q1	8-729-103-19	TRANSISTOR 2SA1206-K1	
C97	1-124-285-00	ELECT 22MF	20% 16V	Q2	8-729-105-88	TRANSISTOR 2SC2570A	
C98	1-124-285-00	ELECT 22MF	20% 16V	Q3	8-729-105-88	TRANSISTOR 2SC2570A	
C99	1-124-285-00	ELECT 22MF	20% 16V	Q4	8-729-105-88	TRANSISTOR 2SC2570A	
				Q5	8-729-103-19	TRANSISTOR 2SA1206-K1	
	DIODE			Q6	8-729-105-88	TRANSISTOR 2SC2570A	
D1	8-719-911-19	DIODE 1SS119		Q7	8-729-105-88	TRANSISTOR 2SC2570A	
D2	8-719-911-19	DIODE 1SS119		Q8	8-729-105-88	TRANSISTOR 2SC2570A	
D3	8-719-911-19	DIODE 1SS119		Q9	8-729-103-19	TRANSISTOR 2SA1206-K1	
D4	8-719-100-71	DIODE RD15E-B2		Q10	8-729-105-88	TRANSISTOR 2SC2570A	
D5	8-719-911-19	DIODE 1SS119					
D6	8-719-100-38	DIODE RD6.2E-B2		Q11	8-729-105-88	TRANSISTOR 2SC2570A	
D7	8-719-100-71	DIODE RD15E-B2		Q12	8-729-105-88	TRANSISTOR 2SC2570A	
D8	8-719-911-19	DIODE 1SS119		Q13	8-729-103-19	TRANSISTOR 2SA1206-K1	
D9	8-719-100-71	DIODE RD15E-B2		Q14	8-729-105-88	TRANSISTOR 2SC2570A	
D10	8-719-100-54	DIODE RD9.1E-B2		Q15	8-729-105-88	TRANSISTOR 2SC2570A	
D11	8-719-100-71	DIODE RD15E-B2		Q16	8-729-105-88	TRANSISTOR 2SC2570A	
D12	8-719-100-38	DIODE RD6.2E-B2		Q17	8-729-103-19	TRANSISTOR 2SA1206-K1	
D13	8-719-911-19	DIODE 1SS119		Q18	8-729-105-88	TRANSISTOR 2SC2570A	
D14	8-719-100-54	DIODE RD9.1E-B2		Q19	8-729-105-88	TRANSISTOR 2SC2570A	
D15	8-719-100-38	DIODE RD6.2E-B2		Q20	8-729-105-88	TRANSISTOR 2SC2570A	
D16	8-719-911-19	DIODE 1SS119		Q21	8-729-103-19	TRANSISTOR 2SA1206-K1	
D17	8-719-100-54	DIODE RD9.1E-B2		Q22	8-729-105-88	TRANSISTOR 2SC2570A	
D18	8-719-911-19	DIODE 1SS119		Q23	8-729-105-88	TRANSISTOR 2SC2570A	
D19	8-719-100-54	DIODE RD9.1E-B2		Q24	8-729-105-88	TRANSISTOR 2SC2570A	
D20	8-719-911-19	DIODE 1SS119		Q25	8-729-103-19	TRANSISTOR 2SA1206-K1	
D21	8-719-100-27	DIODE RD4.7E-B2		Q26	8-729-103-19	TRANSISTOR 2SA1206-K1	
D22	8-719-100-57	DIODE RD10E-B2		Q27	8-729-105-88	TRANSISTOR 2SC2570A	
D23	8-719-100-61	DIODE RD11E-B2		Q28	8-729-103-19	TRANSISTOR 2SA1206-K1	
D24	8-719-100-35	DIODE RD5.6E-B2		Q29	8-729-103-19	TRANSISTOR 2SA1206-K1	
D25	8-719-100-54	DIODE RD9.1E-B2		Q30	8-729-105-88	TRANSISTOR 2SC2570A	
D26	8-719-100-57	DIODE RD10E-B2		Q31	8-729-105-88	TRANSISTOR 2SC2570A	
	DELAY LINE			Q32	8-729-105-88	TRANSISTOR 2SC2570A	
DL1	1-415-466-11	DELAY LINE		Q33	8-729-105-88	TRANSISTOR 2SC2570A	
DL2	1-415-466-11	DELAY LINE		Q34	8-729-103-19	TRANSISTOR 2SA1206-K1	
DL3	1-415-466-11	DELAY LINE		Q35	8-729-105-88	TRANSISTOR 2SC2570A	
				Q36	8-729-105-88	TRANSISTOR 2SC2570A	
				Q37	8-729-378-84	TRANSISTOR 2SD788	
				Q38	8-729-378-84	TRANSISTOR 2SD788	

BB

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
Q39	8-729-117-54	TRANSISTOR 2SA1175		R61	1-249-429-11	CARBON 10K 5% 1/4W	
Q40	8-729-178-54	TRANSISTOR 2SC2785		R62	1-249-405-11	CARBON 100 5% 1/4W	
Q41	8-729-373-92	TRANSISTOR 2SB739		R63	1-215-394-00	METAL 75 1% 1/6W	
Q42	8-729-373-92	TRANSISTOR 2SB739		R64	1-249-405-11	CARBON 100 5% 1/4W	
Q43	8-729-117-54	TRANSISTOR 2SA1175		R65	1-249-427-11	CARBON 6.8K 5% 1/4W	
<u>RESISTOR</u>				R66	1-249-405-11	CARBON 100 5% 1/4W	
R1	1-249-435-11	CARBON 33K 5% 1/4W		R67	1-249-435-11	CARBON 33K 5% 1/4W	
R2	1-249-429-11	CARBON 10K 5% 1/4W		R68	1-249-405-11	CARBON 100 5% 1/4W	
R3	1-249-405-11	CARBON 100 5% 1/4W		R69	1-249-423-11	CARBON 3.3K 5% 1/4W	
R4	1-249-405-11	CARBON 100 5% 1/4W		R70	1-249-405-11	CARBON 100 5% 1/4W	
R5	1-249-427-11	CARBON 6.8K 5% 1/4W		R71	1-249-405-11	CARBON 100 5% 1/4W	
R6	1-249-405-11	CARBON 100 5% 1/4W		R72	1-249-405-11	CARBON 100 5% 1/4W	
R7	1-249-405-11	CARBON 100 5% 1/4W		R73	1-249-421-11	CARBON 2.2K 5% 1/4W	
R8	1-249-435-11	CARBON 33K 5% 1/4W		R74	1-249-437-11	CARBON 47K 5% 1/4W	
R9	1-249-423-11	CARBON 3.3K 5% 1/4W		R75	1-215-413-00	METAL 470 1% 1/6W	
R10	1-249-405-11	CARBON 100 5% 1/4W		R76	1-215-393-00	METAL 68 1% 1/6W	
R11	1-249-405-11	CARBON 100 5% 1/4W		R77	1-215-420-00	METAL 910 1% 1/6W	
R12	1-249-405-11	CARBON 100 5% 1/4W		R78	1-215-391-00	METAL 56 1% 1/6W	
R13	1-249-421-11	CARBON 2.2K 5% 1/4W		R79	1-215-428-00	METAL 2K 1% 1/6W	
R14	1-215-421-00	METAL 1K 1% 1/6W		R80	1-215-429-00	METAL 2.2K 1% 1/6W	
R15	1-249-405-11	CARBON 100 5% 1/4W		R81	1-215-443-00	METAL 8.2K 1% 1/6W	
R16	1-215-439-00	METAL 5.6K 1% 1/6W		R82	1-249-405-11	CARBON 100 5% 1/4W	
R17	1-215-459-00	METAL 39K 1% 1/6W		R83	1-215-413-00	METAL 470 1% 1/6W	
R18	1-215-421-00	METAL 1K 1% 1/6W		R84	1-249-417-11	CARBON 1K 5% 1/4W	
R19	1-249-437-11	CARBON 47K 5% 1/4W		R85	1-249-405-11	CARBON 100 5% 1/4W	
R20	1-215-413-00	METAL 470 1% 1/6W		R86	1-249-421-11	CARBON 2.2K 5% 1/4W	
R21	1-215-384-00	METAL 30 1% 1/6W		R87	1-249-405-11	CARBON 100 5% 1/4W	
R22	1-215-407-00	METAL 270 1% 1/6W		R88	1-249-405-11	CARBON 100 5% 1/4W	
R25	1-215-429-00	METAL 2.2K 1% 1/6W		R89	1-249-405-11	CARBON 100 5% 1/4W	
R26	1-215-443-00	METAL 8.2K 1% 1/6W		R90	1-249-405-11	CARBON 100 5% 1/4W	
R27	1-249-405-11	CARBON 100 5% 1/4W		R91	1-215-429-00	METAL 2.2K 1% 1/6W	
R28	1-215-413-00	METAL 470 1% 1/6W		R92	1-249-405-11	CARBON 100 5% 1/4W	
R29	1-249-417-11	CARBON 1K 5% 1/4W		R93	1-249-405-11	CARBON 100 5% 1/4W	
R30	1-249-405-11	CARBON 100 5% 1/4W		R94	1-249-405-11	CARBON 100 5% 1/4W	
R31	1-249-421-11	CARBON 2.2K 5% 1/4W		R95	1-249-418-11	CARBON 1.2K 5% 1/4W	
R32	1-249-405-11	CARBON 100 5% 1/4W		R96	1-215-397-00	METAL 100 1% 1/6W	
R33	1-249-405-11	CARBON 100 5% 1/4W		R97	1-215-397-00	METAL 100 1% 1/6W	
R34	1-249-427-11	CARBON 6.8K 5% 1/4W		R98	1-249-405-11	CARBON 100 5% 1/4W	
R35	1-249-405-11	CARBON 100 5% 1/4W		R99	1-249-405-11	CARBON 100 5% 1/4W	
R36	1-249-435-11	CARBON 33K 5% 1/4W		R100	1-249-405-11	CARBON 100 5% 1/4W	
R37	1-249-405-11	CARBON 100 5% 1/4W		R101	1-249-431-11	CARBON 15K 5% 1/4W	
R38	1-215-429-00	METAL 2.2K 1% 1/6W		R102	1-215-405-00	METAL 220 1% 1/6W	
R39	1-249-405-11	CARBON 100 5% 1/4W		R103	1-215-411-00	METAL 390 1% 1/6W	
R40	1-249-405-11	CARBON 100 5% 1/4W		R104	1-215-429-00	METAL 2.2K 1% 1/6W	
R41	1-249-405-11	CARBON 100 5% 1/4W		R106	1-249-405-11	CARBON 100 5% 1/4W	
R42	1-249-418-11	CARBON 1.2K 5% 1/4W		R107	1-215-415-00	METAL 560 1% 1/6W	
R43	1-215-397-00	METAL 100 1% 1/6W		R108	1-249-405-11	CARBON 100 5% 1/4W	
R44	1-215-397-00	METAL 100 1% 1/6W		R109	1-249-405-11	CARBON 100 5% 1/4W	
R45	1-249-405-11	CARBON 100 5% 1/4W		R110	1-249-421-11	CARBON 2.2K 5% 1/4W	
R46	1-249-405-11	CARBON 100 5% 1/4W		R111	1-215-393-00	METAL 68 1% 1/6W	
R47	1-249-427-11	CARBON 6.8K 5% 1/4W		R112	1-249-429-11	CARBON 10K 5% 1/4W	
R48	1-249-405-11	CARBON 100 5% 1/4W		R113	1-249-405-11	CARBON 100 5% 1/4W	
R49	1-249-435-11	CARBON 33K 5% 1/4W		R114	1-249-405-11	CARBON 100 5% 1/4W	
R50	1-249-431-11	CARBON 15K 5% 1/4W		R115	1-249-405-11	CARBON 100 5% 1/4W	
R51	1-215-405-00	METAL 220 1% 1/6W		R116	1-249-405-11	CARBON 100 5% 1/4W	
R52	1-215-411-00	METAL 390 1% 1/6W		R117	1-249-423-11	CARBON 3.3K 5% 1/4W	
R53	1-215-429-00	METAL 2.2K 1% 1/6W		R118	1-249-405-11	CARBON 100 5% 1/4W	
R55	1-249-405-11	CARBON 100 5% 1/4W		R119	1-249-405-11	CARBON 100 5% 1/4W	
R56	1-215-415-00	METAL 560 1% 1/6W		R120	1-249-405-11	CARBON 100 5% 1/4W	
R57	1-249-405-11	CARBON 100 5% 1/4W		R121	1-249-421-11	CARBON 2.2K 5% 1/4W	
R58	1-249-405-11	CARBON 100 5% 1/4W		R122	1-215-421-00	METAL 1K 1% 1/6W	
R59	1-249-421-11	CARBON 2.2K 5% 1/4W		R123	1-249-405-11	CARBON 100 5% 1/4W	
R60	1-215-393-00	METAL 68 1% 1/6W		R124	1-215-439-00	METAL 5.6K 1% 1/6W	
				R125	1-215-459-00	METAL 39K 1% 1/6W	
				R126	1-215-421-00	METAL 1K 1% 1/6W	

BB

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R127	1-249-437-11	CARBON	47K 5% 1/4W	R195	1-215-397-00	METAL	100 1% 1/6W
R128	1-215-413-00	METAL	470 1% 1/6W	R196	1-215-397-00	METAL	100 1% 1/6W
R131	1-215-379-00	METAL	18 1% 1/6W	R197	1-249-405-11	CARBON	100 5% 1/4W
R132	1-215-406-00	METAL	240 1% 1/6W	R198	1-249-405-11	CARBON	100 5% 1/4W
R133	1-215-429-00	METAL	2.2K 1% 1/6W	R199	1-249-421-11	CARBON	2.2K 5% 1/4W
R134	1-215-443-00	METAL	8.2K 1% 1/6W	R200	1-215-428-00	METAL	2K 1% 1/6W
R135	1-249-405-11	CARBON	100 5% 1/4W	R201	1-215-407-00	METAL	270 1% 1/6W
R136	1-215-413-00	METAL	470 1% 1/6W	R202	1-215-441-00	METAL	6.8K 1% 1/6W
R137	1-249-417-11	CARBON	1K 5% 1/4W	R203	1-215-437-00	METAL	4.7K 1% 1/6W
R138	1-249-405-11	CARBON	100 5% 1/4W	R204	1-249-401-11	CARBON	47 5% 1/4W
R139	1-249-421-11	CARBON	2.2K 5% 1/4W	R205	1-215-419-00	METAL	820 1% 1/6W
R140	1-249-405-11	CARBON	100 5% 1/4W	R206	1-215-413-00	METAL	470 1% 1/6W
R141	1-249-405-11	CARBON	100 5% 1/4W	R207	1-215-453-00	METAL	22K 1% 1/6W
R142	1-249-405-11	CARBON	100 5% 1/4W	R208	1-215-433-00	METAL	3.3K 1% 1/6W
R143	1-249-405-11	CARBON	100 5% 1/4W	R209	1-249-405-11	CARBON	100 5% 1/4W
R144	1-215-429-00	METAL	2.2K 1% 1/6W	R210	1-249-405-11	CARBON	100 5% 1/4W
R145	1-249-405-11	CARBON	100 5% 1/4W	R211	1-215-429-00	METAL	2.2K 1% 1/6W
R146	1-249-405-11	CARBON	100 5% 1/4W	R212	1-215-405-00	METAL	220 1% 1/6W
R147	1-249-405-11	CARBON	100 5% 1/4W	R213	1-215-391-00	METAL	56 1% 1/6W
R148	1-249-418-11	CARBON	1.2K 5% 1/4W	R214	1-215-413-00	METAL	470 1% 1/6W
R149	1-215-397-00	METAL	100 1% 1/6W	R215	1-215-417-00	METAL	680 1% 1/6W
R150	1-215-397-00	METAL	100 1% 1/6W	R216	1-249-405-11	CARBON	100 5% 1/4W
R151	1-249-405-11	CARBON	100 5% 1/4W	R217	1-249-405-11	CARBON	100 5% 1/4W
R152	1-249-405-11	CARBON	100 5% 1/4W	R218	1-249-422-11	CARBON	2.7K 5% 1/4W
R153	1-249-405-11	CARBON	100 5% 1/4W	R219	1-215-397-00	METAL	100 1% 1/6W
R154	1-249-431-11	CARBON	15K 5% 1/4W	R220	1-215-397-00	METAL	100 1% 1/6W
R155	1-215-405-00	METAL	220 1% 1/6W	R221	1-249-422-11	CARBON	2.7K 5% 1/4W
R156	1-215-411-00	METAL	390 1% 1/6W	R222	1-247-736-11	CARBON	56 5% 1/2W
R157	1-215-429-00	METAL	2.2K 1% 1/6W	R223	1-249-417-11	CARBON	1K 5% 1/4W
R159	1-249-405-11	CARBON	100 5% 1/4W	R224	1-249-438-11	CARBON	56K 5% 1/4W
R160	1-215-415-00	METAL	560 1% 1/6W	R225	1-249-426-11	CARBON	5.6K 5% 1/4W
R161	1-249-405-11	CARBON	100 5% 1/4W	R226	1-249-437-11	CARBON	47K 5% 1/4W
R162	1-249-405-11	CARBON	100 5% 1/4W	R227	1-249-417-11	CARBON	1K 5% 1/4W
R163	1-249-421-11	CARBON	2.2K 5% 1/4W	R228	1-244-833-00	CARBON	22 5% 1/2W
R164	1-215-393-00	METAL	68 1% 1/6W	R229	1-249-417-11	CARBON	1K 5% 1/4W
R165	1-215-399-00	METAL	120 1% 1/6W	R230	1-249-441-11	CARBON	100K 5% 1/4W
R166	1-215-428-00	METAL	2K 1% 1/6W	R231	1-249-441-11	CARBON	100K 5% 1/4W
R167	1-215-391-00	METAL	56 1% 1/6W	R232	1-215-419-00	METAL	820 1% 1/6W
R168	1-215-409-00	METAL	330 1% 1/6W	R233	1-215-455-00	METAL	27K 1% 1/6W
R169	1-215-418-00	METAL	750 1% 1/6W	R236	1-215-415-00	METAL	560 1% 1/6W
R170	1-215-429-00	METAL	2.2K 1% 1/6W	R237	1-215-432-00	METAL	3K 1% 1/6W
R171	1-215-455-00	METAL	27K 1% 1/6W	R239	1-249-409-11	CARBON	220 5% 1/4W
R172	1-215-415-00	METAL	560 1% 1/6W	R240	1-249-438-11	CARBON	56K 5% 1/4W
R173	1-215-434-00	METAL	3.6K 1% 1/6W	R241	1-249-438-11	CARBON	56K 5% 1/4W
R174	1-249-405-11	CARBON	100 5% 1/4W	R242	1-249-438-11	CARBON	56K 5% 1/4W
R175	1-249-401-11	CARBON	47 5% 1/4W	R243	1-249-438-11	CARBON	56K 5% 1/4W
R176	1-249-426-11	CARBON	5.6K 5% 1/4W	R244	1-249-438-11	CARBON	56K 5% 1/4W
R177	1-249-411-11	CARBON	330 5% 1/4W	R245	1-249-438-11	CARBON	56K 5% 1/4W
R178	1-249-437-11	CARBON	47K 5% 1/4W	R246	1-249-438-11	CARBON	56K 5% 1/4W
R179	1-249-423-11	CARBON	3.3K 5% 1/4W	R247	1-249-438-11	CARBON	56K 5% 1/4W
R180	1-249-405-11	CARBON	100 5% 1/4W	R248	1-249-438-11	CARBON	56K 5% 1/4W
R181	1-249-405-11	CARBON	100 5% 1/4W	R249	1-249-409-11	CARBON	220 5% 1/4W
R182	1-249-405-11	CARBON	100 5% 1/4W				
R183	1-249-421-11	CARBON	2.2K 5% 1/4W				
R184	1-249-405-11	CARBON	100 5% 1/4W				
R185	1-249-415-11	CARBON	680 5% 1/4W				
R186	1-249-405-11	CARBON	100 5% 1/4W				
R187	1-215-397-00	METAL	100 1% 1/6W				
R188	1-215-397-00	METAL	100 1% 1/6W				
R189	1-249-405-11	CARBON	100 5% 1/4W				
R190	1-249-423-11	CARBON	3.3K 5% 1/4W				
R191	1-249-405-11	CARBON	100 5% 1/4W				
R192	1-249-405-11	CARBON	100 5% 1/4W				
R193	1-249-405-11	CARBON	100 5% 1/4W				
R194	1-249-415-11	CARBON	680 5% 1/4W				

VARIABLE RESISTOR

RV1	1-237-512-21	RES, ADJ, CERMET 100
RV2	1-237-512-21	RES, ADJ, CERMET 100
RV3	1-237-512-21	RES, ADJ, CERMET 100
RV4	1-237-513-21	RES, ADJ, CERMET 200
RV5	1-237-512-21	RES, ADJ, CERMET 100
RV6	1-237-513-21	RES, ADJ, CERMET 200
RV7	1-237-513-21	RES, ADJ, CERMET 200
RV8	1-237-513-21	RES, ADJ, CERMET 200
RV9	1-237-512-21	RES, ADJ, CERMET 100
RV10	1-237-512-21	RES, ADJ, CERMET 100

BB | BE

7. ELECTRICAL PARTS LIST

BE

BF

Ref.No.	Part No.	Description				
R6	1-249-429-11	CARBON	10K	5%	1/4W	
R7	1-249-429-11	CARBON	10K	5%	1/4W	
R8	1-249-429-11	CARBON	10K	5%	1/4W	
R9	1-249-417-11	CARBON	1K	5%	1/4W	
R10	1-249-429-11	CARBON	10K	5%	1/4W	
R11	1-249-429-11	CARBON	10K	5%	1/4W	
R12	1-249-429-11	CARBON	10K	5%	1/4W	
R13	1-249-429-11	CARBON	10K	5%	1/4W	
R14	1-249-429-11	CARBON	10K	5%	1/4W	
R15	1-249-405-11	CARBON	100	5%	1/4W	
R16	1-215-378-00	METAL	16	1%	1/6W	
R17	1-215-378-00	METAL	16	1%	1/6W	
R18	1-215-383-00	METAL	27	1%	1/6W	
R19	1-249-429-11	CARBON	10K	5%	1/4W	
R20	1-249-429-11	CARBON	10K	5%	1/4W	
R21	1-215-391-00	METAL	56	1%	1/6W	
R22	1-215-377-00	METAL	15	1%	1/6W	
R23	1-215-377-00	METAL	15	1%	1/6W	
R24	1-247-848-11	CARBON	5.1K	5%	1/4W	
R25	1-215-437-00	METAL	4.7K	1%	1/6W	
R26	1-215-405-00	METAL	220	1%	1/6W	
R27	1-215-428-00	METAL	2K	1%	1/6W	
R28	1-247-773-00	CARBON	3.9	5%	1/4W	
R29	1-249-429-11	CARBON	10K	5%	1/4W	
R30	1-247-804-11	CARBON	75	5%	1/4W	
R31	1-249-429-11	CARBON	10K	5%	1/4W	
R32	1-247-773-00	CARBON	3.9	5%	1/4W	
R33	1-249-429-11	CARBON	10K	5%	1/4W	
R34	1-215-441-00	METAL	6.8K	1%	1/6W	
R35	1-249-429-11	CARBON	10K	5%	1/4W	
R36	1-247-804-11	CARBON	75	5%	1/4W	
R37	1-247-773-00	CARBON	3.9	5%	1/4W	
R38	1-247-773-00	CARBON	3.9	5%	1/4W	
R39	1-249-411-11	CARBON	330	5%	1/4W	
R40	1-249-411-11	CARBON	330	5%	1/4W	
R41	1-249-435-11	CARBON	33K	5%	1/4W	
R42	1-249-405-11	CARBON	100	5%	1/4W	
R44	1-215-399-00	METAL	120	1%	1/6W	
R45	1-215-431-00	METAL	2.7K	1%	1/6W	
R46	1-215-455-00	METAL	27K	1%	1/6W	
R47	1-215-421-00	METAL	1K	1%	1/6W	
R48	1-215-441-00	METAL	6.8K	1%	1/6W	
R49	1-215-413-00	METAL	470	1%	1/6W	
R50	1-215-441-00	METAL	6.8K	1%	1/6W	
R51	1-215-421-00	METAL	1K	1%	1/6W	
R52	1-215-431-00	METAL	2.7K	1%	1/6W	
R53	1-215-415-00	METAL	560	1%	1/6W	
R54	1-215-433-00	METAL	3.3K	1%	1/6W	
R55	1-249-413-11	CARBON	470	5%	1/4W	
R56	1-215-427-00	METAL	1.8K	1%	1/6W	
R57	1-249-421-11	CARBON	2.2K	5%	1/4W	
R58	1-249-421-11	CARBON	2.2K	5%	1/4W	
R61	1-249-425-11	CARBON	4.7K	5%	1/4W	

RESISTOR BLOCK

RB1	1-231-407-00	RESISTOR BLOCK 2.2K
RB2	1-231-407-00	RESISTOR BLOCK 2.2K

VARIABLE RESISTOR

RV1	1-237-518-21	RES, ADJ, CERMET 10K
-----	--------------	----------------------

Ref.No.	Part No.	Description	Remark
		CRYSTAL	
X1	1-527-819-11	VIBRATOR, CRYSTAL	

	*A-1296-452-A	BF BOARD, COMPLETE	

	*4-353-708-00	HOOK, FINGER	
		CONNECTOR	
BF1	*1-562-729-11	CONNECTOR, MULTI 64P	
	4-378-915-01	NUT (M2.6), PLATE; BF1	
		CAPACITOR	
C001	1-124-478-11	ELECT 100MF	20% 25V
C002	1-101-004-00	CERAMIC 0.01MF	50V
C003	1-124-478-11	ELECT 100MF	20% 25V
C004	1-101-004-00	CERAMIC 0.01MF	50V
C005	1-124-478-11	ELECT 100MF	20% 25V
C006	1-124-478-11	ELECT 100MF	20% 25V
C007	1-124-478-11	ELECT 100MF	20% 25V
C008	1-101-004-00	CERAMIC 0.01MF	50V
C009	1-124-478-11	ELECT 100MF	20% 25V
C010	1-101-004-00	CERAMIC 0.01MF	50V
C011	1-124-478-11	ELECT 100MF	20% 25V
C012	1-101-004-00	CERAMIC 0.01MF	50V
C013	1-101-004-00	CERAMIC 0.01MF	50V
C014	1-101-004-00	CERAMIC 0.01MF	50V
C015	1-101-004-00	CERAMIC 0.01MF	50V
C017	1-101-004-00	CERAMIC 0.01MF	50V
C019	1-101-004-00	CERAMIC 0.01MF	50V
C020	1-101-004-00	CERAMIC 0.01MF	50V
C101	1-124-477-11	ELECT 47MF	20% 25V
C102	1-124-477-11	ELECT 47MF	20% 25V
C103	1-124-477-11	ELECT 47MF	20% 25V
C104	1-102-824-00	CERAMIC 470PF	5% 50V
C105	1-102-824-00	CERAMIC 470PF	5% 50V
C106	1-124-477-11	ELECT 47MF	20% 25V
C107	1-124-477-11	ELECT 47MF	20% 25V
C108	1-101-004-00	CERAMIC 0.01MF	50V
C109	1-124-120-11	ELECT 220MF	20% 25V
C111	1-124-925-11	ELECT 2.2MF	20% 50V
C112	1-126-233-11	ELECT 22MF	20% 25V
C113	1-124-477-11	ELECT 47MF	20% 25V
C115	1-124-477-11	ELECT 47MF	20% 25V
C116	1-108-800-91	MYLAR 0.0047MF	5% 50V
C117	1-101-004-00	CERAMIC 0.01MF	50V
C118	1-102-973-00	CERAMIC 100PF	5% 50V
C119	1-101-004-00	CERAMIC 0.01MF	50V
C120	1-124-477-11	ELECT 47MF	20% 25V
C121	1-124-499-11	ELECT 1MF	20% 50V
C122	1-102-978-00	CERAMIC 220PF	5% 50V
C123	1-101-004-00	CERAMIC 0.01MF	50V
C124	1-102-820-00	CERAMIC 330PF	5% 50V
C125	1-101-004-00	CERAMIC 0.01MF	50V
C126	1-101-880-00	CERAMIC 47PF	5% 50V
C127	1-101-880-00	CERAMIC 47PF	5% 50V
C128	1-124-006-11	ELECT 10MF	20% 25V
C129	1-102-959-00	CERAMIC 22PF	5% 50V
C130	1-102-498-00	CERAMIC 100PF	5% 50V
C131	1-102-824-00	CERAMIC 470PF	5% 50V

BF

7. ELECTRICAL PARTS LIST

BF

7. ELECTRICAL PARTS LIST

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
Q302	8-729-178-54	TRANSISTOR 2SC2785		R136	1-215-445-00	METAL 10K 1%	1/6W
Q303	8-729-117-54	TRANSISTOR 2SA1175		R137	1-215-415-00	METAL 560 1%	1/6W
Q304	8-729-178-54	TRANSISTOR 2SC2785		R138	1-215-443-00	METAL 8.2K 1%	1/6W
Q305	8-729-178-54	TRANSISTOR 2SC2785		R139	1-215-419-00	METAL 820 1%	1/6W
Q306	8-729-117-54	TRANSISTOR 2SA1175		R140	1-215-443-00	METAL 8.2K 1%	1/6W
Q307	8-729-178-54	TRANSISTOR 2SC2785		R141	1-215-433-00	METAL 3.3K 1%	1/6W
RESISTOR				R142	1-249-415-11	CARBON 680 5%	1/4W
R52	1-249-416-11	CARBON 820 5%	1/4W	R143	1-215-427-00	METAL 1.8K 1%	1/6W
R001	1-249-441-11	CARBON 100K 5%	1/4W	R144	1-249-401-11	CARBON 47 5%	1/4W
R002	1-249-441-11	CARBON 100K 5%	1/4W	R145	1-249-421-11	CARBON 2.2K 5%	1/4W
R003	1-249-441-11	CARBON 100K 5%	1/4W	R146	1-249-431-11	CARBON 15K 5%	1/4W
R006	1-249-441-11	CARBON 100K 5%	1/4W	R147	1-215-435-00	METAL 3.9K 1%	1/6W
R008	1-249-417-11	CARBON 1K 5%	1/4W	R148	1-249-425-11	CARBON 4.7K 5%	1/4W
R009	1-249-441-11	CARBON 100K 5%	1/4W	R149	1-249-437-11	CARBON 47K 5%	1/4W
R010	1-249-437-11	CARBON 47K 5%	1/4W	R150	1-247-881-00	CARBON 120K 5%	1/4W
R011	1-249-437-11	CARBON 47K 5%	1/4W	R151	1-247-895-00	CARBON 470K 5%	1/4W
R012	1-249-437-11	CARBON 47K 5%	1/4W	R153	1-215-411-00	METAL 390 1%	1/6W
R013	1-249-437-11	CARBON 47K 5%	1/4W	R154	1-249-418-11	CARBON 1.2K 5%	1/4W
R015	1-249-437-11	CARBON 47K 5%	1/4W	R155	1-215-441-00	METAL 6.8K 1%	1/6W
R016	1-249-405-11	CARBON 100 5%	1/4W	R156	1-215-413-00	METAL 470 1%	1/6W
R017	1-249-405-11	CARBON 100 5%	1/4W	R157	1-249-425-11	CARBON 4.7K 5%	1/4W
R019	1-249-405-11	CARBON 100 5%	1/4W	R158	1-247-887-00	CARBON 220K 5%	1/4W
R020	1-249-437-11	CARBON 47K 5%	1/4W	R159	1-249-423-11	CARBON 3.3K 5%	1/4W
R021	1-249-437-11	CARBON 47K 5%	1/4W	R160	1-249-421-11	CARBON 2.2K 5%	1/4W
R022	1-249-437-11	CARBON 47K 5%	1/4W	R161	1-249-419-11	CARBON 1.5K 5%	1/4W
R023	1-249-437-11	CARBON 47K 5%	1/4W	R162	1-249-421-11	CARBON 2.2K 5%	1/4W
R024	1-249-437-11	CARBON 47K 5%	1/4W	R163	1-249-421-11	CARBON 2.2K 5%	1/4W
R101	1-249-410-11	CARBON 270 5%	1/4W	R164	1-249-405-11	CARBON 100 5%	1/4W
R102	1-215-469-00	METAL 100K 1%	1/6W	R165	1-249-405-11	CARBON 100 5%	1/4W
R103	1-249-405-11	CARBON 100 5%	1/4W	R166	1-249-429-11	CARBON 10K 5%	1/4W
R104	1-215-464-00	METAL 62K 1%	1/6W	R167	1-249-405-11	CARBON 100 5%	1/4W
R105	1-249-405-11	CARBON 100 5%	1/4W	R168	1-249-425-11	CARBON 4.7K 5%	1/4W
R106	1-249-426-11	CARBON 5.6K 5%	1/4W	R169	1-249-405-11	CARBON 100 5%	1/4W
R107	1-249-411-11	CARBON 330 5%	1/4W	R170	1-249-405-11	CARBON 100 5%	1/4W
R108	1-215-469-00	METAL 100K 1%	1/6W	R171	1-249-414-11	CARBON 560 5%	1/4W
R109	1-249-405-11	CARBON 100 5%	1/4W	R172	1-249-414-11	CARBON 560 5%	1/4W
R110	1-215-464-00	METAL 62K 1%	1/6W	R173	1-249-430-11	CARBON 12K 5%	1/4W
R111	1-249-405-11	CARBON 100 5%	1/4W	R174	1-249-405-11	CARBON 100 5%	1/4W
R112	1-249-426-11	CARBON 5.6K 5%	1/4W	R175	1-249-429-11	CARBON 10K 5%	1/4W
R113	1-249-425-11	CARBON 4.7K 5%	1/4W	R176	1-249-429-11	CARBON 10K 5%	1/4W
R114	1-215-469-00	METAL 100K 1%	1/6W	R177	1-247-889-00	CARBON 270K 5%	1/4W
R115	1-249-405-11	CARBON 100 5%	1/4W	R178	1-249-423-11	CARBON 3.3K 5%	1/4W
R116	1-215-464-00	METAL 62K 1%	1/6W	R179	1-215-421-00	METAL 1K 1%	1/6W
R117	1-249-405-11	CARBON 100 5%	1/4W	R180	1-215-441-00	METAL 6.8K 1%	1/6W
R118	1-249-426-11	CARBON 5.6K 5%	1/4W	R181	1-215-469-00	METAL 100K 1%	1/6W
R119	1-249-399-11	CARBON 33 5%	1/4W	R182	1-215-460-00	METAL 43K 1%	1/6W
R120	1-249-399-11	CARBON 33 5%	1/4W	R183	1-215-465-00	METAL 68K 1%	1/6W
R121	1-249-428-11	CARBON 8.2K 5%	1/4W	R184	1-215-441-00	METAL 6.8K 1%	1/6W
R122	1-249-429-11	CARBON 10K 5%	1/4W	R185	1-249-416-11	CARBON 820 5%	1/4W
R123	1-249-427-11	CARBON 6.8K 5%	1/4W	R187	1-249-417-11	CARBON 1K 5%	1/4W
R124	1-249-405-11	CARBON 100 5%	1/4W	R188	1-249-393-11	CARBON 10 5%	1/4W
R125	1-249-401-11	CARBON 47 5%	1/4W	R189	1-249-405-11	CARBON 100 5%	1/4W
R126	1-249-401-11	CARBON 47 5%	1/4W	R201	1-249-417-11	CARBON 1K 5%	1/4W
R127	1-215-397-00	METAL 100 1%	1/6W	R202	1-249-421-11	CARBON 2.2K 5%	1/4W
R128	1-215-405-00	METAL 220 1%	1/6W	R203	1-249-417-11	CARBON 1K 5%	1/4W
R129	1-215-423-00	METAL 1.2K 1%	1/6W	R204	1-249-393-11	CARBON 10 5%	1/4W
R130	1-215-435-00	METAL 3.9K 1%	1/6W	R205	1-249-417-11	CARBON 1K 5%	1/4W
R131	1-215-469-00	METAL 100K 1%	1/6W	R206	1-249-405-11	CARBON 100 5%	1/4W
R132	1-215-441-00	METAL 6.8K 1%	1/6W	R207	1-215-421-00	METAL 1K 1%	1/6W
R133	1-215-443-00	METAL 8.2K 1%	1/6W	R208	1-215-421-00	METAL 1K 1%	1/6W
R134	1-249-427-11	CARBON 6.8K 5%	1/4W	R209	1-215-421-00	METAL 1K 1%	1/6W
R135	1-249-405-11	CARBON 100 5%	1/4W	R210	1-215-437-00	METAL 4.7K 1%	1/6W
				R211	1-215-459-00	METAL 39K 1%	1/6W
				R212	1-249-429-11	CARBON 10K 5%	1/4W

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R213	1-249-425-11	CARBON 4.7K 5% 1/4W		C13	1-124-120-11	ELECT 220MF 20% 25V	
R214	1-249-429-11	CARBON 10K 5% 1/4W		C100	1-136-165-00	FILM 0.1MF 5% 50V	
R221	1-249-414-11	CARBON 560 5% 1/4W		C101	1-124-478-11	ELECT 100MF 20% 25V	
R222	1-249-414-11	CARBON 560 5% 1/4W		C102	1-101-004-00	CERAMIC 0.01MF 50V	
R301	1-249-421-11	CARBON 2.2K 5% 1/4W		C103	1-101-004-00	CERAMIC 0.01MF 50V	
R302	1-249-421-11	CARBON 2.2K 5% 1/4W		C104	1-101-004-00	CERAMIC 0.01MF 50V	
R303	1-249-405-11	CARBON 100 5% 1/4W		C105	1-101-004-00	CERAMIC 0.01MF 50V	
R304	1-249-405-11	CARBON 100 5% 1/4W		C106	1-101-004-00	CERAMIC 0.01MF 50V	
R305	1-249-429-11	CARBON 10K 5% 1/4W		C107	1-101-004-00	CERAMIC 0.01MF 50V	
R306	1-249-405-11	CARBON 100 5% 1/4W		C108	1-101-004-00	CERAMIC 0.01MF 50V	
R307	1-249-425-11	CARBON 4.7K 5% 1/4W		C109	1-124-478-11	ELECT 100MF 20% 25V	
R308	1-249-405-11	CARBON 100 5% 1/4W		C110	1-101-004-00	CERAMIC 0.01MF 50V	
R309	1-249-405-11	CARBON 100 5% 1/4W		C111	1-101-004-00	CERAMIC 0.01MF 50V	
R310	1-249-430-11	CARBON 12K 5% 1/4W		C112	1-101-004-00	CERAMIC 0.01MF 50V	
R311	1-249-417-11	CARBON 1K 5% 1/4W		C113	1-101-004-00	CERAMIC 0.01MF 50V	
R312	1-249-417-11	CARBON 1K 5% 1/4W		C114	1-123-875-11	ELECT 10MF 20% 50V	
R313	1-249-405-11	CARBON 100 5% 1/4W		C115	1-123-875-11	ELECT 10MF 20% 50V	
R314	1-249-429-11	CARBON 10K 5% 1/4W		C116	1-101-004-00	CERAMIC 0.01MF 50V	
R315	1-249-429-11	CARBON 10K 5% 1/4W		C119	1-124-477-11	ELECT 47MF 20% 25V	
R316	1-247-889-00	CARBON 270K 5% 1/4W		C120	1-101-004-00	CERAMIC 0.01MF 50V	
R317	1-249-423-11	CARBON 3.3K 5% 1/4W		C121	1-124-477-11	ELECT 47MF 20% 25V	
R318	1-249-405-11	CARBON 100 5% 1/4W		C122	1-101-004-00	CERAMIC 0.01MF 50V	
R319	1-249-437-11	CARBON 47K 5% 1/4W		C123	1-101-004-00	CERAMIC 0.01MF 50V	
R320	1-249-429-11	CARBON 10K 5% 1/4W		C124	1-136-161-00	FILM 0.047MF 5% 50V	
R321	1-215-433-00	METAL 3.3K 1% 1/6W		C125	1-123-875-11	ELECT 10MF 20% 50V	
R322	1-215-433-00	METAL 3.3K 1% 1/6W		C126	1-136-161-00	FILM 0.047MF 5% 50V	
R323	1-249-423-11	CARBON 3.3K 5% 1/4W		C127	1-101-004-00	CERAMIC 0.01MF 50V	
R324	1-215-460-00	METAL 43K 1% 1/6W		C128	1-101-004-00	CERAMIC 0.01MF 50V	
R325	1-215-449-00	METAL 15K 1% 1/6W		C129	1-101-004-00	CERAMIC 0.01MF 50V	
*****				C130	1-101-004-00	CERAMIC 0.01MF 50V	
VARIABLE RESISTOR				C131	1-101-004-00	CERAMIC 0.01MF 50V	
RV101	1-237-520-21	RES, ADJ, CERMET 50K		C132	1-101-004-00	CERAMIC 0.01MF 50V	
RV102	1-237-520-21	RES, ADJ, CERMET 50K		C200	1-124-477-11	ELECT 47MF 20% 25V	
RV201	1-237-520-21	RES, ADJ, CERMET 10K		C201	1-101-004-00	CERAMIC 0.01MF 50V	
RV202	1-237-518-21	RES, ADJ, CERMET 10K		C202	1-102-959-00	CERAMIC 22PF 5% 50V	
RV203	1-237-518-21	RES, ADJ, CERMET 10K		C203	1-102-498-00	CERAMIC 100PF 5% 50V	
RV204	1-237-517-21	RES, ADJ, CERMET 5K		C204	1-102-973-00	CERAMIC 100PF 5% 50V	
RV301	1-237-519-21	RES, ADJ, CERMET 20K		C205	1-102-074-00	CERAMIC 0.001MF 10% 50V	
*****				C206	1-101-004-00	CERAMIC 0.01MF 50V	
*A-1296-453-A BG BOARD, COMPLETE				C207	1-101-004-00	CERAMIC 0.01MF 50V	
*****				C208	1-101-004-00	CERAMIC 0.01MF 50V	
*4-353-708-00 HOOK, FINGER				C209	1-102-959-00	CERAMIC 22PF 5% 50V	
*****				C210	1-102-498-00	CERAMIC 100PF 5% 50V	
CONNECTOR				C211	1-101-004-00	CERAMIC 0.01MF 50V	
BG1	*1-562-729-11	CONNECTOR, MULTI 64P		C212	1-102-959-00	CERAMIC 22PF 5% 50V	
	4-378-915-01	NUT (M2.6), PLATE; BG1		C213	1-102-959-00	CERAMIC 22PF 5% 50V	
CAPACITOR				C214	1-101-004-00	CERAMIC 0.01MF 50V	
C1	1-124-477-11	ELECT 47MF 20% 25V		C215	1-102-973-00	CERAMIC 100PF 5% 50V	
C2	1-101-004-00	CERAMIC 0.01MF 50V		C216	1-102-074-00	CERAMIC 0.001MF 10% 50V	
C3	1-124-477-11	ELECT 47MF 20% 25V		C217	1-101-004-00	CERAMIC 0.01MF 50V	
C4	1-101-004-00	CERAMIC 0.01MF 50V		C218	1-101-004-00	CERAMIC 0.01MF 50V	
C5	1-124-120-11	ELECT 220MF 20% 25V		C219	1-124-443-00	ELECT 100MF 20% 10V	
C6	1-124-477-11	ELECT 47MF 20% 25V		C220	1-101-004-00	CERAMIC 0.01MF 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V		C221	1-124-478-11	ELECT 100MF 20% 25V	
C8	1-124-120-11	ELECT 220MF 20% 25V		C222	1-101-004-00	CERAMIC 0.01MF 50V	
C9	1-124-477-11	ELECT 47MF 20% 25V		C223	1-124-477-11	ELECT 47MF 20% 25V	
C10	1-101-004-00	CERAMIC 0.01MF 50V		C301	1-101-004-00	CERAMIC 0.01MF 50V	
C11	1-124-477-11	ELECT 47MF 20% 25V		C302	1-102-824-00	CERAMIC 470PF 5% 50V	
C12	1-101-004-00	CERAMIC 0.01MF 50V		C303	1-102-959-00	CERAMIC 22PF 5% 50V	
				C305	1-101-004-00	CERAMIC 0.01MF 50V	
				C306	1-101-004-00	CERAMIC 0.01MF 50V	
				C307	1-101-004-00	CERAMIC 0.01MF 50V	
				C308	1-101-004-00	CERAMIC 0.01MF 50V	
				C309	1-102-973-00	CERAMIC 100PF 5% 50V	
				C310	1-102-074-00	CERAMIC 0.001MF 10% 50V	

BG

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
C311	1-101-004-00	CERAMIC 0.01MF	50V	IC307	8-759-202-11	IC TC74HC00P	
C312	1-101-004-00	CERAMIC 0.01MF	50V	IC308	8-759-202-85	IC TC74HC112P	
C313	1-102-973-00	CERAMIC 100PF	5%				
C314	1-102-074-00	CERAMIC 0.001MF	10%				
C315	1-101-004-00	CERAMIC 0.01MF	50V			COIL	
C316	1-101-004-00	CERAMIC 0.01MF	50V	L1	1-408-429-00	INDUCTOR 470UH	
C317	1-101-004-00	CERAMIC 0.01MF	50V	L2	1-408-429-00	INDUCTOR 470UH	
C318	1-102-500-00	CERAMIC 150PF	5%	L3	1-408-429-00	INDUCTOR 470UH	
C319	1-102-500-00	CERAMIC 150PF	5%				
C320	1-102-973-00	CERAMIC 100PF	5%			TRANSISTOR	
C321	1-102-074-00	CERAMIC 0.001MF	10%				
C322	1-123-875-11	ELECT 10MF	20%	Q101	8-729-201-05	TRANSISTOR 2SC2878-B	
C323	1-101-004-00	CERAMIC 0.01MF	50V	Q102	8-729-201-05	TRANSISTOR 2SC2878-B	
C324	1-101-004-00	CERAMIC 0.01MF	50V	Q103	8-729-117-54	TRANSISTOR 2SA1175	
C325	1-102-973-00	CERAMIC 100PF	5%	Q104	8-729-201-05	TRANSISTOR 2SC2878-B	
C326	1-102-074-00	CERAMIC 0.001MF	10%	Q105	8-729-178-54	TRANSISTOR 2SC2785	
C327	1-101-004-00	CERAMIC 0.01MF	50V	Q106	8-729-117-54	TRANSISTOR 2SA1175	
C328	1-101-004-00	CERAMIC 0.01MF	50V	Q107	8-729-117-54	TRANSISTOR 2SA1175	
C329	1-124-443-00	ELECT 100MF	20%	Q110	8-729-178-54	TRANSISTOR 2SC2785	
C330	1-101-004-00	CERAMIC 0.01MF	50V	Q111	8-729-178-54	TRANSISTOR 2SC2785	
C331	1-124-478-11	ELECT 100MF	20%	Q112	8-729-178-54	TRANSISTOR 2SC2785	
C332	1-101-004-00	CERAMIC 0.01MF	50V	Q113	8-729-178-54	TRANSISTOR 2SC2785	
C333	1-124-443-00	ELECT 100MF	20%	Q114	8-729-117-54	TRANSISTOR 2SA1175	
C334	1-101-004-00	CERAMIC 0.01MF	50V	Q115	8-729-117-54	TRANSISTOR 2SA1175	
C335	1-124-477-11	ELECT 47MF	20%	Q116	8-729-117-54	TRANSISTOR 2SA1175	
C336	1-101-004-00	CERAMIC 0.01MF	50V	Q117	8-729-802-45	TRANSISTOR 2SK125-5	
C337	1-124-499-11	ELECT 1MF	20%	Q118	8-729-117-54	TRANSISTOR 2SA1175	
C338	1-123-875-11	ELECT 10MF	20%	Q200	8-729-178-54	TRANSISTOR 2SC2785	
				Q201	8-729-117-54	TRANSISTOR 2SA1175	
				Q202	8-729-178-54	TRANSISTOR 2SC2785	
				Q203	8-729-178-54	TRANSISTOR 2SC2785	
				Q204	8-729-117-54	TRANSISTOR 2SA1175	
				Q205	8-729-117-54	TRANSISTOR 2SA1175	
				Q206	8-729-178-54	TRANSISTOR 2SC2785	
				Q207	8-729-178-54	TRANSISTOR 2SC2785	
				Q208	8-729-117-54	TRANSISTOR 2SA1175	
				Q300	8-729-178-54	TRANSISTOR 2SC2785	
				Q301	8-729-117-54	TRANSISTOR 2SA1175	
				Q302	8-729-178-54	TRANSISTOR 2SC2785	
				Q303	8-729-178-54	TRANSISTOR 2SC2785	
				Q304	8-729-117-54	TRANSISTOR 2SA1175	
				Q305	8-729-117-54	TRANSISTOR 2SA1175	
				Q306	8-729-178-54	TRANSISTOR 2SC2785	
				Q307	8-729-178-54	TRANSISTOR 2SC2785	
				Q308	8-729-117-54	TRANSISTOR 2SA1175	
				Q309	8-729-117-54	TRANSISTOR 2SA1175	
				Q310	8-729-178-54	TRANSISTOR 2SC2785	
				Q311	8-729-178-54	TRANSISTOR 2SC2785	
				Q312	8-729-117-54	TRANSISTOR 2SA1175	
				Q313	8-729-117-54	TRANSISTOR 2SA1175	
				Q314	8-729-178-54	TRANSISTOR 2SC2785	
				Q315	8-729-178-54	TRANSISTOR 2SC2785	
				Q316	8-729-117-54	TRANSISTOR 2SA1175	
				Q317	8-729-900-36	TRANSISTOR DTC124ES	
				Q318	8-729-900-36	TRANSISTOR DTC124ES	
				Q319	8-729-178-54	TRANSISTOR 2SC2785	
				Q320	8-729-117-54	TRANSISTOR 2SA1175	
						RESISTOR	
				R100	1-249-405-11	CARBON 100 5% 1/4W	
				R102	1-249-405-11	CARBON 100 5% 1/4W	
				R103	1-215-449-00	METAL 15K 1% 1/6W	
				R104	1-215-429-00	METAL 2.2K 1% 1/6W	
				R105	1-215-449-00	METAL 15K 1% 1/6W	
IC1	8-759-171-05	IC UPC7805H					
IC101	8-759-014-95	IC MC1495L					
IC102	8-759-007-40	IC TL082CP					
IC103	8-759-007-40	IC TL082CP					
IC104	8-759-240-53	IC TC4053BP					
IC105	8-759-007-21	IC MC74HC4053N					
IC201	8-759-203-83	IC TC74HC4538P					
IC202	8-759-203-83	IC TC74HC4538P					
IC203	8-759-203-83	IC TC74HC4538P					
IC204	8-759-202-85	IC TC74HC112P					
IC301	8-759-203-83	IC TC74HC4538P					
IC302	8-759-203-40	IC TC74HC393P					
IC303	8-759-202-11	IC TC74HC00P					
IC304	8-759-203-05	IC TC74HC193P					
IC305	8-759-203-05	IC TC74HC193P					
IC306	8-759-203-83	IC TC74HC4538P					

VARIABLE RESISTOR

BG GA CB

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
RV201	1-224-939-00	RES, ADJ, CERMET 5K					
RV202	1-224-939-00	RES, ADJ, CERMET 5K					

	*1-626-504-11	GA BOARD					

	2-832-007-00	BUSHING (K), INSULATING					
	3-701-809-41	SCREW, TERMINAL (M3X10)					
	*4-026-251-00	SPACER, INSULATING					
	*4-363-404-00	HOLDER, IC					
	4-363-414-00	SPACER, MICA					
CAPACITOR							
C1	1-123-933-00	ELECT 10MF 20% 160V					
C2	1-124-037-00	ELECT 220MF 20% 25V					
C3	1-124-037-00	ELECT 220MF 20% 25V					
C4	1-124-037-00	ELECT 220MF 20% 25V					
C5	1-124-037-00	ELECT 220MF 20% 25V					
C6	1-123-933-00	ELECT 10MF 20% 160V					
C7	1-124-037-00	ELECT 220MF 20% 25V					
C8	1-124-037-00	ELECT 220MF 20% 25V					
C9	1-124-037-00	ELECT 220MF 20% 25V					
C10	1-124-037-00	ELECT 220MF 20% 25V					
C11	1-124-127-91	ELECT 100MF 20% 25V					
C12	1-123-874-00	ELECT 470MF 20% 16V					
C13	1-124-037-00	ELECT 220MF 20% 25V					
C14	1-124-037-00	ELECT 220MF 20% 25V					
C16	1-130-483-00	MYLAR 0.01MF 5% 50V					
C17	1-123-933-00	ELECT 10MF 20% 160V					
DIODE							
D1	8-719-971-20	DIODE ERC38-06					
D2	8-719-971-20	DIODE ERC38-06					
D3	8-719-911-19	DIODE 1SS119					
CONNECTOR							
GA1	*1-560-127-00	PLUG, CONNECTOR (2.5MM) 7P					
GA3	*1-566-054-11	PIN, CONNECTOR 2P					
GA4	*1-566-055-11	PIN, CONNECTOR 3P					
GA5	*1-566-057-11	PIN, CONNECTOR 5P					
GA6	*1-566-059-11	PIN, CONNECTOR 7P					
GA7	*1-566-055-11	PIN, CONNECTOR 3P					
GA8	*1-566-056-11	PIN, CONNECTOR 4P					
GA9	*1-566-054-11	PIN, CONNECTOR 2P					
GA10	*1-566-054-11	PIN, CONNECTOR 2P					
GA11	*1-566-054-11	PIN, CONNECTOR 2P					
GA12	*1-566-058-11	PIN, CONNECTOR 6P					
GA13	*1-508-768-00	PIN, CONNECTOR (5MM PITCH) 6P					
GA14	*1-566-054-11	PIN, CONNECTOR 2P					
GA15	*1-566-058-11	PIN, CONNECTOR 6P					
GA16	*1-566-058-11	PIN, CONNECTOR 6P					
GA17	*1-566-055-11	PIN, CONNECTOR 3P					
GA18	*1-566-057-11	PIN, CONNECTOR 5P					
GA19	*1-566-060-11	PIN, CONNECTOR 8P					
IC							
IC1	8-759-700-06	IC NJM7812B					
IC2	8-759-179-12	IC UPC7912H					
IC3	8-759-700-06	IC NJM7812B					
IC4	8-759-179-12	IC UPC7912H					
TRANSISTOR							
Q1	8-729-900-36	TRANSISTOR DTC124ES					
Q2	8-729-900-63	TRANSISTOR DTA124ES					
Q3	8-729-304-26	TRANSISTOR 2SC3263-0					
Q4	8-729-103-08	TRANSISTOR 2SC3209					
RESISTOR							
R1	1-249-425-11	CARBON 4.7K 5% 1/4W					
R2	1-249-405-11	CARBON 100 5% 1/4W					
R3	1-249-417-11	CARBON 1K 5% 1/4W					
R7	1-249-417-11	CARBON 1K 5% 1/4W					
R8	1-215-875-11	METAL OXIDE 10K 5% 1W F					
R9	1-215-879-91	METAL OXIDE 47K 5% 1W F					
R10	1-217-333-00	WIREWOUND 10 10% 7W F					

	*1-617-465-11	CB BOARD					

	1-526-767-00	SOCKET, PICTURE TUBE					
	1-556-880-51	LEAD ASSY, HIGH-VOLTAGE					
CAPACITOR							
C1	1-102-316-00	CERAMIC 15PF 5% 500V					
C2	1-102-316-00	CERAMIC 15PF 5% 500V					
C3	1-102-316-00	CERAMIC 15PF 5% 500V					
C4	1-102-223-00	CERAMIC 0.0047MF 10% 2KV					
CONNECTOR							
CB1	*1-508-786-00	PIN, CONNECTOR (5MM PITCH) 2P					
CB2	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P					
CB4	*1-566-056-11	PIN, CONNECTOR 4P					
CB5	*1-566-056-11	PIN, CONNECTOR 4P					
CB6	*1-566-056-11	PIN, CONNECTOR 4P					
CB7	*1-566-055-11	PIN, CONNECTOR 3P					
CB8	*1-566-054-11	PIN, CONNECTOR 2P					
COIL							
L1	1-407-681-00	INDUCTOR 1UH					
L2	1-407-681-00	INDUCTOR 1UH					
L3	1-407-681-00	INDUCTOR 1UH					
NEON LAMP							
NL1	1-519-013-13	DISCHARGE TUBE					
NL2	1-519-013-13	DISCHARGE TUBE					
NL3	1-519-013-13	DISCHARGE TUBE					
NL4	1-519-013-13	DISCHARGE TUBE					
NL5	1-519-013-13	DISCHARGE TUBE					
NL6	1-519-013-13	DISCHARGE TUBE					
RESISTOR							
R1	1-202-371-37	SOLID 330 10% 1/4W					
R2	1-202-371-37	SOLID 330 10% 1/4W					
R3	1-202-371-37	SOLID 330 10% 1/4W					
R4	1-202-399-37	SOLID 4.7K 10% 1/4W					
R5	1-202-399-37	SOLID 4.7K 10% 1/4W					
R6	1-202-399-37	SOLID 4.7K 10% 1/4W					
R7	1-202-453-37	SOLID 820K 10% 1/4W					

Ref.No.	Part No.	Description			Remark	Ref.No.	Part No.	Description			Remark
R9	1-202-621-00	SOLID	100K	10%	1/2W	C132	1-101-004-00	CERAMIC	0.01MF		50V
R10	1-202-525-00	SOLID	10	10%	1/2W	C133	1-101-004-00	CERAMIC	0.01MF		50V
R12	1-202-337-37	SOLID	33	10%	1/4W	C134	1-126-101-11	ELECT	100MF	20%	16V
R13	1-202-337-37	SOLID	33	10%	1/4W	C135	1-124-046-00	ELECT	10MF	20%	160V
R14	1-202-337-37	SOLID	33	10%	1/4W	C136	1-108-692-11	MYLAR	0.01MF	10%	200V
						C137	1-126-101-11	ELECT	100MF	20%	16V
						C202	1-102-973-00	CERAMIC	100PF	5%	50V
						C205	1-108-704-11	MYLAR	0.1MF	10%	200V
SG1	1-519-063-XX	DISCHARGING GAP				C206	1-101-004-00	CERAMIC	0.01MF		50V
						C207	1-123-874-00	ELECT	470MF	20%	16V

*A-1335-005-A CA BOARD, COMPLETE						C208	1-124-798-11	ELECT	1MF	20%	160V
*****						C209	1-124-798-11	ELECT	1MF	20%	160V
						C210	1-123-874-00	ELECT	470MF	20%	16V
3-701-809-41 SCREW, TERMINAL (M3X10)						C211	1-123-874-00	ELECT	470MF	20%	16V
4-373-933-01 SHEET (TRANSISTOR), BN						C212	1-102-228-00	CERAMIC	470PF	10%	500V
						C214	1-101-006-00	CERAMIC	0.047MF		50V
						C215	1-124-126-00	ELECT	47MF	20%	25V
						C216	1-102-973-00	CERAMIC	100PF	5%	50V
						C217	1-102-973-00	CERAMIC	100PF	5%	50V
C2	1-102-973-00	CERAMIC	100PF	5%	50V	C218	1-136-167-00	FILM	0.15MF	5%	50V
C5	1-108-704-11	MYLAR	0.1MF	10%	200V	C219	1-101-006-00	CERAMIC	0.047MF		50V
C6	1-101-004-00	CERAMIC	0.01MF		50V	C220	1-136-173-00	FILM	0.47MF	5%	50V
C7	1-123-874-00	ELECT	470MF	20%	16V	C221	1-101-004-00	CERAMIC	0.01MF		50V
C8	1-124-798-11	ELECT	1MF	20%	160V	C222	1-101-006-00	CERAMIC	0.047MF		50V
C9	1-124-798-11	ELECT	1MF	20%	160V	C223	1-108-680-11	MYLAR	0.001MF	10%	200V
C10	1-123-874-00	ELECT	470MF	20%	16V	C224	1-124-798-11	ELECT	1MF	20%	160V
C11	1-123-874-00	ELECT	470MF	20%	16V	C232	1-124-634-11	ELECT	1MF	20%	450V
C12	1-102-228-00	CERAMIC	470PF	10%	500V	C301	1-124-046-00	ELECT	10MF	20%	160V
C14	1-101-006-00	CERAMIC	0.047MF		50V	C302	1-124-046-00	ELECT	10MF	20%	160V
C15	1-124-126-00	ELECT	47MF	20%	25V	C303	1-108-692-11	MYLAR	0.01MF	10%	200V
C16	1-102-973-00	CERAMIC	100PF	5%	50V	C308	1-123-874-00	ELECT	470MF	20%	16V
C17	1-102-973-00	CERAMIC	100PF	5%	50V	C309	1-101-004-00	CERAMIC	0.01MF		50V
C18	1-136-167-00	FILM	0.15MF	5%	50V	C310	1-123-874-00	ELECT	470MF	20%	16V
C19	1-101-006-00	CERAMIC	0.047MF		50V	C311	1-101-004-00	CERAMIC	0.01MF		50V
C20	1-136-173-00	FILM	0.47MF	5%	50V	C312	1-124-046-00	ELECT	10MF	20%	160V
C21	1-101-004-00	CERAMIC	0.01MF		50V	C313	1-124-046-00	ELECT	10MF	20%	160V
C22	1-101-006-00	CERAMIC	0.047MF		50V	C316	1-124-126-00	ELECT	47MF	20%	25V
C23	1-108-680-11	MYLAR	0.001MF	10%	200V	C317	1-101-004-00	CERAMIC	0.01MF		50V
C24	1-124-798-11	ELECT	1MF	20%	160V	C318	1-124-126-00	ELECT	47MF	20%	25V
C32	1-124-634-11	ELECT	1MF	20%	450V	C319	1-101-004-00	CERAMIC	0.01MF		50V
C101	1-124-046-00	ELECT	10MF	20%	160V	C320	1-124-126-00	ELECT	47MF	20%	25V
C102	1-124-046-00	ELECT	10MF	20%	160V	C321	1-101-004-00	CERAMIC	0.01MF		50V
C103	1-108-692-11	MYLAR	0.01MF	10%	200V	C322	1-101-004-00	CERAMIC	0.01MF		50V
C108	1-123-874-00	ELECT	470MF	20%	16V	C323	1-123-874-00	ELECT	470MF	20%	16V
C109	1-101-004-00	CERAMIC	0.01MF		50V	C324	1-123-874-00	ELECT	470MF	20%	16V
C110	1-123-874-00	ELECT	470MF	20%	16V	C325	1-101-004-00	CERAMIC	0.01MF		50V
C111	1-101-004-00	CERAMIC	0.01MF		50V	C326	1-123-874-00	ELECT	470MF	20%	16V
C112	1-124-046-00	ELECT	10MF	20%	160V	C327	1-123-874-00	ELECT	470MF	20%	16V
C113	1-124-046-00	ELECT	10MF	20%	160V	C328	1-101-004-00	CERAMIC	0.01MF		50V
C116	1-124-126-00	ELECT	47MF	20%	25V	C329	1-101-004-00	CERAMIC	0.01MF		50V
C117	1-101-004-00	CERAMIC	0.01MF		50V	C330	1-126-101-11	ELECT	100MF	20%	16V
C118	1-124-126-00	ELECT	47MF	20%	25V	C331	1-101-004-00	CERAMIC	0.01MF		50V
C119	1-101-004-00	CERAMIC	0.01MF		50V	C332	1-101-004-00	CERAMIC	0.01MF		50V
C120	1-124-126-00	ELECT	47MF	20%	25V	C333	1-101-004-00	CERAMIC	0.01MF		50V
C121	1-101-004-00	CERAMIC	0.01MF		50V	C334	1-126-101-11	ELECT	100MF	20%	16V
C122	1-101-004-00	CERAMIC	0.01MF		50V	C335	1-124-046-00	ELECT	10MF	20%	160V
C123	1-123-874-00	ELECT	470MF	20%	16V	C336	1-108-692-11	MYLAR	0.01MF	10%	200V
C124	1-123-874-00	ELECT	470MF	20%	16V	C337	1-126-101-11	ELECT	100MF	20%	16V
C125	1-101-004-00	CERAMIC	0.01MF		50V	C402	1-102-973-00	CERAMIC	100PF	5%	50V
C126	1-123-874-00	ELECT	470MF	20%	16V	C405	1-108-704-11	MYLAR	0.1MF	10%	200V
C127	1-123-874-00	ELECT	470MF	20%	16V	C406	1-101-004-00	CERAMIC	0.01MF		50V
C128	1-101-004-00	CERAMIC	0.01MF		50V	C407	1-123-874-00	ELECT	470MF	20%	16V
C129	1-101-004-00	CERAMIC	0.01MF		50V	C408	1-124-798-11	ELECT	1MF	20%	160V
C130	1-126-101-11	ELECT	100MF	20%	16V	C409	1-124-798-11	ELECT	1MF	20%	160V
C131	1-101-004-00	CERAMIC	0.01MF		50V	C410	1-123-874-00	ELECT	470MF	20%	16V

CA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
C411	1-123-874-00	ELECT	470MF 20% 16V	C722	1-124-499-11	ELECT	1MF 20% 50V
C412	1-102-228-00	CERAMIC	470PF 10% 500V	C723	1-101-004-00	CERAMIC	0.01MF 50V
C414	1-101-006-00	CERAMIC	0.047MF 50V	C731	1-136-165-00	FILM	0.1MF 50V
C415	1-124-126-00	ELECT	47MF 20% 25V	C732	1-126-101-11	ELECT	100MF 20% 16V
C416	1-102-973-00	CERAMIC	100PF 5% 50V	C751	1-124-046-00	ELECT	10MF 20% 160V
C417	1-102-973-00	CERAMIC	100PF 5% 50V	C752	1-124-126-00	ELECT	47MF 20% 25V
C418	1-136-167-00	FILM	0.15MF 5% 50V	C753	1-124-046-00	ELECT	10MF 20% 160V
C419	1-101-006-00	CERAMIC	0.047MF 50V	<u>CONNECTOR</u>			
C420	1-136-173-00	FILM	0.47MF 5% 50V	CA1	*1-566-057-11	PIN, CONNECTOR	5P
C421	1-101-004-00	CERAMIC	0.01MF 50V	CA2	*1-566-057-11	PIN, CONNECTOR	5P
C422	1-101-006-00	CERAMIC	0.047MF 50V	CA3	*1-566-057-11	PIN, CONNECTOR	5P
C423	1-108-680-11	MYLAR	0.001MF 10% 200V	CA4	*1-566-055-11	PIN, CONNECTOR	3P
C424	1-124-798-11	ELECT	1MF 20% 160V	CA5	*1-566-060-11	PIN, CONNECTOR	8P
C432	1-124-634-11	ELECT	1MF 20% 450V	CA6	*1-566-054-11	PIN, CONNECTOR	2P
C501	1-124-046-00	ELECT	10MF 20% 160V	CA7	*1-566-054-11	PIN, CONNECTOR	2P
C502	1-124-046-00	ELECT	10MF 20% 160V	CA8	*1-566-057-11	PIN, CONNECTOR	5P
C503	1-108-692-11	MYLAR	0.01MF 10% 200V	CA9	*1-566-056-11	PIN, CONNECTOR	4P
C508	1-123-874-00	ELECT	470MF 20% 16V	CA10	*1-566-056-11	PIN, CONNECTOR	4P
C509	1-101-004-00	CERAMIC	0.01MF 50V	CA11	*1-566-056-11	PIN, CONNECTOR	4P
C510	1-123-874-00	ELECT	470MF 20% 16V	CA12	*1-508-784-00	PIN, CONNECTOR (5MM PITCH)	1P
C511	1-101-004-00	CERAMIC	0.01MF 50V	CA13	*1-508-784-00	PIN, CONNECTOR (5MM PITCH)	1P
C512	1-124-046-00	ELECT	10MF 20% 160V	CA14	*1-508-784-00	PIN, CONNECTOR (5MM PITCH)	1P
C513	1-124-046-00	ELECT	10MF 20% 160V	<u>TRIMMER</u>			
C516	1-124-126-00	ELECT	47MF 20% 25V	CV1	1-141-181-11	CAP, TRIMMER	
C517	1-101-004-00	CERAMIC	0.01MF 50V	CV201	1-141-181-11	CAP, TRIMMER	
C518	1-124-126-00	ELECT	47MF 20% 25V	CV401	1-141-181-11	CAP, TRIMMER	
C519	1-101-004-00	CERAMIC	0.01MF 50V	<u>DIODE</u>			
C520	1-124-126-00	ELECT	47MF 20% 25V	D1	8-719-911-19	DIODE 1SS119	
C521	1-101-004-00	CERAMIC	0.01MF 50V	D2	8-719-911-19	DIODE 1SS119	
C522	1-101-004-00	CERAMIC	0.01MF 50V	D3	8-719-100-35	DIODE RD5.6E-B2	
C523	1-123-874-00	ELECT	470MF 20% 16V	D4	8-719-911-19	DIODE 1SS119	
C524	1-123-874-00	ELECT	470MF 20% 16V	D5	8-719-911-19	DIODE 1SS119	
C525	1-101-004-00	CERAMIC	0.01MF 50V	D6	8-719-911-19	DIODE 1SS119	
C526	1-123-874-00	ELECT	470MF 20% 16V	D7	8-719-911-19	DIODE 1SS119	
C527	1-123-874-00	ELECT	470MF 20% 16V	D8	8-719-911-19	DIODE 1SS119	
C528	1-101-004-00	CERAMIC	0.01MF 50V	D9	8-719-911-19	DIODE 1SS119	
C529	1-101-004-00	CERAMIC	0.01MF 50V	D10	8-719-100-54	DIODE RD9.1E-B2	
C530	1-126-101-11	ELECT	100MF 20% 16V	D11	8-719-901-83	DIODE 1SS83	
C531	1-101-004-00	CERAMIC	0.01MF 50V	D12	8-719-901-83	DIODE 1SS83	
C532	1-101-004-00	CERAMIC	0.01MF 50V	D13	8-719-100-61	DIODE RD11E-B2	
C533	1-101-004-00	CERAMIC	0.01MF 50V	D16	8-719-911-19	DIODE 1SS119	
C534	1-126-101-11	ELECT	100MF 20% 16V	D17	8-719-911-19	DIODE 1SS119	
C535	1-124-046-00	ELECT	10MF 20% 160V	D18	8-719-911-19	DIODE 1SS119	
C536	1-108-692-11	MYLAR	0.01MF 10% 200V	D19	8-719-911-19	DIODE 1SS119	
C537	1-126-101-11	ELECT	100MF 20% 16V	D20	8-719-911-19	DIODE 1SS119	
C614	1-126-101-11	ELECT	100MF 20% 16V	D21	8-719-911-19	DIODE 1SS119	
C615	1-126-101-11	ELECT	100MF 20% 16V	D22	8-719-911-19	DIODE 1SS119	
C626	1-124-046-00	ELECT	10MF 20% 160V	D23	8-719-911-19	DIODE 1SS119	
C628	1-101-888-00	CERAMIC	68PF 5% 50V	D24	8-719-971-20	DIODE ERC38-06	
C629	1-101-004-00	CERAMIC	0.01MF 50V	D25	8-719-911-19	DIODE 1SS119	
C630	1-124-126-00	ELECT	47MF 20% 25V	D26	8-719-911-19	DIODE 1SS119	
C631	1-136-173-00	FILM	0.47MF 5% 50V	D201	8-719-911-19	DIODE 1SS119	
C632	1-102-074-00	CERAMIC	0.001MF 10% 50V	D202	8-719-911-19	DIODE 1SS119	
C633	1-101-004-00	CERAMIC	0.01MF 50V	D203	8-719-100-35	DIODE RD5.6E-B2	
C634	1-102-123-00	CERAMIC	0.0033MF 10% 50V	D204	8-719-911-19	DIODE 1SS119	
C701	1-102-973-00	CERAMIC	100PF 5% 50V	D205	8-719-911-19	DIODE 1SS119	
C702	1-124-499-11	ELECT	1MF 20% 50V	D206	8-719-911-19	DIODE 1SS119	
C703	1-101-004-00	CERAMIC	0.01MF 50V	D207	8-719-911-19	DIODE 1SS119	
C704	1-124-046-00	ELECT	10MF 20% 160V	D208	8-719-911-19	DIODE 1SS119	
C705	1-126-101-11	ELECT	100MF 20% 16V				
C706	1-124-046-00	ELECT	10MF 20% 160V				
C711	1-102-973-00	CERAMIC	100PF 5% 50V				
C712	1-124-499-11	ELECT	1MF 20% 50V				
C713	1-101-004-00	CERAMIC	0.01MF 50V				
C721	1-102-973-00	CERAMIC	100PF 5% 50V				

CA

7. ELECTRICAL PARTS LIST

7. ELECTRICAL PARTS LIST

7-28

CA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R72	1-215-433-00	METAL	3.3K 1% 1/6W	R254	1-249-435-11	CARBON	33K 5% 1/4W
R73	1-249-426-11	CARBON	5.6K 5% 1/4W	R255	1-249-431-11	CARBON	15K 5% 1/4W
R75	1-249-426-11	CARBON	5.6K 5% 1/4W	R256	1-249-441-11	CARBON	100K 5% 1/4W
R76	1-249-397-11	CARBON	22 5% 1/4W	R257	1-249-429-11	CARBON	10K 5% 1/4W
R77	1-215-438-00	METAL	5.1K 1% 1/6W	R258	1-249-429-11	CARBON	10K 5% 1/4W
R78	1-214-908-00	METAL	62K 1% 1/2W	R259	1-249-441-11	CARBON	100K 5% 1/4W
R79	1-249-468-11	CARBON	82K 5% 1/4W	R261	1-249-429-11	CARBON	10K 5% 1/4W
R80	1-249-405-11	CARBON	100 5% 1/4W	R263	1-215-457-00	METAL	33K 1% 1/6W
R84	1-247-903-00	CARBON	1M 5% 1/4W	R264	1-215-409-00	METAL	330 1% 1/6W
R85	1-249-429-11	CARBON	10K 5% 1/4W	R265	1-215-421-00	METAL	1K 1% 1/6W
R86	1-249-429-11	CARBON	10K 5% 1/4W	R266	1-249-433-11	CARBON	22K 5% 1/4W
R98	1-249-406-11	CARBON	120 5% 1/4W	R267	1-249-421-11	CARBON	2.2K 5% 1/4W
R99	1-249-411-11	CARBON	330 5% 1/4W	R268	1-249-421-11	CARBON	2.2K 5% 1/4W
R100	1-249-411-11	CARBON	330 5% 1/4W	R269	1-215-433-00	METAL	3.3K 1% 1/6W
R102	1-249-405-11	CARBON	100 5% 1/4W	R270	1-215-433-00	METAL	3.3K 1% 1/6W
R103	1-249-405-11	CARBON	100 5% 1/4W	R271	1-215-441-00	METAL	6.8K 1% 1/6W
R104	1-215-405-00	METAL	220 1% 1/6W	R272	1-215-433-00	METAL	3.3K 1% 1/6W
R105	1-215-401-11	METAL	150 1% 1/6W	R273	1-249-426-11	CARBON	5.6K 5% 1/4W
R148	1-247-701-11	CARBON	120 5% 1/4W	R275	1-249-426-11	CARBON	5.6K 5% 1/4W
R160	1-249-417-11	CARBON	1K 5% 1/4W	R276	1-249-397-11	CARBON	22 5% 1/4W
R201	1-214-702-00	METAL	75 1% 1/4W	R277	1-215-438-00	METAL	5.1K 1% 1/6W
R202	1-249-405-11	CARBON	100 5% 1/4W	R278	1-214-908-00	METAL	62K 1% 1/2W
R203	1-215-419-00	METAL	820 1% 1/6W	R279	1-249-468-11	CARBON	82K 5% 1/4W
R204	1-249-416-11	CARBON	820 5% 1/4W	R280	1-249-405-11	CARBON	100 5% 1/4W
R205	1-215-401-11	METAL	150 1% 1/6W	R284	1-247-903-00	CARBON	1M 5% 1/4W
R206	1-215-401-11	METAL	150 1% 1/6W	R285	1-249-429-11	CARBON	10K 5% 1/4W
R207	1-215-421-00	METAL	1K 1% 1/6W	R286	1-249-429-11	CARBON	10K 5% 1/4W
R208	1-215-427-00	METAL	1.8K 1% 1/6W	R298	1-249-406-11	CARBON	120 5% 1/4W
R209	1-215-420-00	METAL	910 1% 1/6W	R299	1-249-411-11	CARBON	330 5% 1/4W
R210	1-215-401-11	METAL	150 1% 1/6W	R300	1-249-411-11	CARBON	330 5% 1/4W
R211	1-249-405-11	CARBON	100 5% 1/4W	R302	1-249-405-11	CARBON	100 5% 1/4W
R212	1-215-409-00	METAL	330 1% 1/6W	R303	1-249-405-11	CARBON	100 5% 1/4W
R213	1-215-427-00	METAL	1.8K 1% 1/6W	R304	1-215-405-00	METAL	220 1% 1/6W
R214	1-249-397-11	CARBON	22 5% 1/4W	R305	1-215-401-11	METAL	150 1% 1/6W
R215	1-215-381-00	METAL	22 1% 1/6W	R348	1-247-701-11	CARBON	120 5% 1/4W
R216	1-215-423-00	METAL	1.2K 1% 1/6W	R360	1-249-417-11	CARBON	1K 5% 1/4W
R217	1-249-407-11	CARBON	150 5% 1/4W	R401	1-214-702-00	METAL	75 1% 1/4W
R218	1-249-389-11	CARBON	4.7 5% 1/4W	R402	1-249-405-11	CARBON	100 5% 1/4W
R219	1-249-389-11	CARBON	4.7 5% 1/4W	R403	1-215-419-00	METAL	820 1% 1/6W
R220	1-249-407-11	CARBON	150 5% 1/4W	R404	1-249-416-11	CARBON	820 5% 1/4W
R222	1-249-406-11	CARBON	120 5% 1/4W	R405	1-215-401-11	METAL	150 1% 1/6W
R223	1-214-733-00	METAL	1.5K 1% 1/4W	R406	1-215-401-11	METAL	150 1% 1/6W
R224	1-249-401-11	CARBON	47 5% 1/4W	R407	1-215-421-00	METAL	1K 1% 1/6W
R225	1-214-907-00	METAL	56K 1% 1/2W	R408	1-215-427-00	METAL	1.8K 1% 1/6W
R226	1-214-907-00	METAL	56K 1% 1/2W	R409	1-215-420-00	METAL	910 1% 1/6W
R232	1-249-400-11	CARBON	39 5% 1/4W	R410	1-215-401-11	METAL	150 1% 1/6W
R234	1-249-400-11	CARBON	39 5% 1/4W	R411	1-249-405-11	CARBON	100 5% 1/4W
R235	1-249-397-11	CARBON	22 5% 1/4W	R412	1-215-409-00	METAL	330 1% 1/6W
R236	1-249-397-11	CARBON	22 5% 1/4W	R413	1-215-427-00	METAL	1.8K 1% 1/6W
R237	1-249-407-11	CARBON	150 5% 1/4W	R414	1-249-397-11	CARBON	22 5% 1/4W
R238	1-249-407-11	CARBON	150 5% 1/4W	R415	1-215-381-00	METAL	22 1% 1/6W
R239	1-249-421-11	CARBON	2.2K 5% 1/4W	R416	1-215-423-00	METAL	1.2K 1% 1/6W
R240	1-214-907-00	METAL	56K 1% 1/2W	R417	1-249-407-11	CARBON	150 5% 1/4W
R241	1-249-393-11	CARBON	10 5% 1/4W	R418	1-249-389-11	CARBON	4.7 5% 1/4W
R242	1-249-393-11	CARBON	10 5% 1/4W	R419	1-249-389-11	CARBON	4.7 5% 1/4W
R243	1-214-733-00	METAL	1.5K 1% 1/4W	R420	1-249-407-11	CARBON	150 5% 1/4W
R244	1-214-705-00	METAL	100 1% 1/4W	R422	1-249-406-11	CARBON	120 5% 1/4W
R245	1-214-705-00	METAL	100 1% 1/4W	R423	1-214-733-00	METAL	1.5K 1% 1/4W
R246	1-215-389-00	METAL	47 1% 1/6W	R424	1-249-401-11	CARBON	47 5% 1/4W
R247	1-215-389-00	METAL	47 1% 1/6W	R425	1-214-907-00	METAL	56K 1% 1/2W
R249	1-249-400-11	CARBON	39 5% 1/4W	R426	1-214-907-00	METAL	56K 1% 1/2W
R250	1-249-400-11	CARBON	39 5% 1/4W	R432	1-249-400-11	CARBON	39 5% 1/4W
R251	1-215-449-00	METAL	15K 1% 1/6W	R434	1-249-400-11	CARBON	39 5% 1/4W
R252	1-202-549-00	SOLID	100 5% 1/2W	R435	1-249-397-11	CARBON	22 5% 1/4W
R253	1-249-435-11	CARBON	33K 5% 1/4W				

[illegible]7-30

DA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
CAPACITOR				C69	1-101-004-00	CERAMIC	0.01MF 50V
C1	1-101-004-00	CERAMIC	0.01MF 50V	C70	1-101-004-00	CERAMIC	0.01MF 50V
C2	1-130-471-00	MYLAR	0.001MF 5% 50V	C71	1-123-356-00	ELECT	10MF 20% 16V
C3	1-102-978-00	CERAMIC	220PF 5% 50V	C72	1-101-004-00	CERAMIC	0.01MF 50V
C4	1-136-169-00	FILM	0.22MF 5% 50V	C74	1-130-471-00	MYLAR	0.001MF 5% 50V
C5	1-123-356-00	ELECT	10MF 20% 16V	C75	1-136-165-00	FILM	0.1MF 5% 50V
C6	1-136-153-00	FILM	0.01MF 5% 50V	C76	1-101-004-00	CERAMIC	0.01MF 50V
C7	1-123-356-00	ELECT	10MF 20% 16V	C77	1-101-004-00	CERAMIC	0.01MF 50V
C8	1-123-380-00	ELECT	1MF 20% 50V	C78	1-123-356-00	ELECT	10MF 20% 16V
C9	1-136-165-00	FILM	0.1MF 5% 50V	C79	1-136-169-00	FILM	0.22MF 5% 50V
C10	1-101-004-00	CERAMIC	0.01MF 50V	C80	1-101-004-00	CERAMIC	0.01MF 50V
C11	1-101-004-00	CERAMIC	0.01MF 50V	C81	1-101-004-00	CERAMIC	0.01MF 50V
C12	1-123-356-00	ELECT	10MF 20% 16V	C82	1-101-004-00	CERAMIC	0.01MF 50V
C13	1-130-475-00	MYLAR	0.0022MF 5% 50V	C83	1-101-004-00	CERAMIC	0.01MF 50V
C14	1-101-004-00	CERAMIC	0.01MF 50V	C84	1-124-274-00	ELECT	4.7MF 20% 50V
C15	1-123-381-00	ELECT	2.2MF 20% 50V	C85	1-124-274-00	ELECT	4.7MF 20% 50V
C16	1-123-381-00	ELECT	2.2MF 20% 50V	C86	1-123-356-00	ELECT	10MF 20% 16V
C17	1-124-274-00	ELECT	4.7MF 20% 50V	C87	1-124-274-00	ELECT	4.7MF 20% 50V
C18	1-123-369-00	ELECT	4.7MF 20% 50V	C88	1-136-165-00	FILM	0.1MF 5% 50V
C19	1-123-356-00	ELECT	10MF 20% 16V	C89	1-101-004-00	CERAMIC	0.01MF 50V
C20	1-101-004-00	CERAMIC	0.01MF 50V	C100	1-130-479-00	MYLAR	0.0047MF 5% 50V
C21	1-101-004-00	CERAMIC	0.01MF 50V	C101	1-130-479-00	MYLAR	0.0047MF 5% 50V
C24	1-123-321-00	ELECT	220MF 20% 16V	C102	1-130-479-00	MYLAR	0.0047MF 5% 50V
C25	1-123-321-00	ELECT	220MF 20% 16V	C103	1-130-479-00	MYLAR	0.0047MF 5% 50V
C26	1-123-321-00	ELECT	220MF 20% 16V	C104	1-101-004-00	CERAMIC	0.01MF 50V
C27	1-123-321-00	ELECT	220MF 20% 16V	C108	1-136-153-00	FILM	0.01MF 5% 50V
C28	1-136-165-00	FILM	0.1MF 5% 50V	C109	1-136-165-00	FILM	0.1MF 5% 50V
C29	1-101-004-00	CERAMIC	0.01MF 50V	C110	1-101-004-00	CERAMIC	0.01MF 50V
C30	1-101-004-00	CERAMIC	0.01MF 50V	C112	1-101-004-00	CERAMIC	0.01MF 50V
C32	1-136-169-00	FILM	0.22MF 5% 50V	C113	1-101-004-00	CERAMIC	0.01MF 50V
C34	1-123-333-00	ELECT	100MF 20% 16V	C114	1-101-004-00	CERAMIC	0.01MF 50V
C35	1-124-274-00	ELECT	4.7MF 20% 50V	C115	1-101-004-00	CERAMIC	0.01MF 50V
C36	1-101-004-00	CERAMIC	0.01MF 50V	DIODE			
C37	1-101-004-00	CERAMIC	0.01MF 50V	D1	8-719-102-68	DIODE RD5.1E-N2	
C38	1-123-356-00	ELECT	10MF 20% 16V	D10	8-719-911-19	DIODE 1SS119	
C39	1-124-270-11	ELECT	0.47MF 20% 50V	D11	8-719-911-19	DIODE 1SS119	
C40	1-136-165-00	FILM	0.1MF 5% 50V	D12	8-719-911-19	DIODE 1SS119	
C41	1-123-356-00	ELECT	10MF 20% 16V	D13	8-719-911-19	DIODE 1SS119	
C42	1-101-004-00	CERAMIC	0.01MF 50V	D14	8-719-911-19	DIODE 1SS119	
C43	1-101-004-00	CERAMIC	0.01MF 50V	D15	8-719-911-19	DIODE 1SS119	
C44	1-123-356-00	ELECT	10MF 20% 16V	D17	8-719-971-20	DIODE ERC38-06	
C45	1-130-477-00	MYLAR	0.0033MF 5% 50V	D18	8-719-971-20	DIODE ERC38-06	
C46	1-123-356-00	ELECT	10MF 20% 16V	D25	8-719-971-20	DIODE ERC38-06	
C47	1-101-004-00	CERAMIC	0.01MF 50V	CONNECTOR			
C48	1-101-004-00	CERAMIC	0.01MF 50V	DA1	*1-562-729-11	CONNECTOR, MULTI 64P	
C49	1-101-004-00	CERAMIC	0.01MF 50V	IC			
C50	1-123-321-00	ELECT	220MF 20% 16V	IC1	8-759-729-03	IC NJM2903D	
C51	1-123-356-00	ELECT	10MF 20% 16V	IC2	8-759-700-81	IC NJM555D	
C52	1-130-471-00	MYLAR	0.001MF 5% 50V	IC3	8-759-145-58	IC UPC4558C	
C53	1-101-004-00	CERAMIC	0.01MF 50V	IC4	8-759-131-11	IC UPC311C	
C54	1-101-004-00	CERAMIC	0.01MF 50V	IC5	8-759-145-58	IC UPC4558C	
C55	1-123-356-00	ELECT	10MF 20% 16V	IC7	8-759-145-58	IC UPC4558C	
C56	1-101-004-00	CERAMIC	0.01MF 50V	IC8	8-759-990-82	IC TL082CP	
C57	1-130-471-00	MYLAR	0.001MF 5% 50V	IC9	8-759-133-90	IC UPC339C	
C58	1-123-356-00	ELECT	10MF 20% 16V	IC10	8-759-729-03	IC NJM2903D	
C59	1-101-004-00	CERAMIC	0.01MF 50V	IC11	8-759-109-88	IC UPC624C	
C61	1-123-356-00	ELECT	10MF 20% 16V	IC12	8-759-145-58	IC UPC4558C	
C62	1-101-004-00	CERAMIC	0.01MF 50V	IC13	8-759-109-88	IC UPC624C	
C63	1-101-004-00	CERAMIC	0.01MF 50V	IC14	8-759-145-58	IC UPC4558C	
C64	1-123-380-00	ELECT	1MF 20% 50V				
C65	1-130-471-00	MYLAR	0.001MF 5% 50V				
C67	1-101-004-00	CERAMIC	0.01MF 50V				
C68	1-130-471-00	MYLAR	0.001MF 5% 50V				

7. ELECTRICAL PARTS LIST

DA

7. ELECTRICAL PARTS LIST

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R113	1-215-463-00	METAL	56K 1% 1/6W				
R114	1-215-437-00	METAL	4.7K 1% 1/6W				
R115	1-215-445-00	METAL	10K 1% 1/6W				
R116	1-215-445-00	METAL	10K 1% 1/6W				
R117	1-249-425-11	CARBON	4.7K 5% 1/4W				
R118	1-215-445-00	METAL	10K 1% 1/6W				
R119	1-215-433-00	METAL	3.3K 1% 1/6W				
R120	1-215-445-00	METAL	10K 1% 1/6W				
R121	1-249-425-11	CARBON	4.7K 5% 1/4W				
R122	1-215-445-00	METAL	10K 1% 1/6W				
R123	1-215-461-00	METAL	47K 1% 1/6W				
R124	1-249-421-11	CARBON	2.2K 5% 1/4W				
R125	1-249-427-11	CARBON	6.8K 5% 1/4W				
R126	1-249-427-11	CARBON	6.8K 5% 1/4W				
R127	1-249-427-11	CARBON	6.8K 5% 1/4W				
R128	1-249-441-11	CARBON	100K 5% 1/4W				
R129	1-215-437-00	METAL	4.7K 1% 1/6W				
R130	1-215-437-00	METAL	4.7K 1% 1/6W				
R131	1-215-437-00	METAL	4.7K 1% 1/6W				
R132	1-215-437-00	METAL	4.7K 1% 1/6W				
R133	1-215-437-00	METAL	4.7K 1% 1/6W				
R134	1-215-437-00	METAL	4.7K 1% 1/6W				
R135	1-215-437-00	METAL	4.7K 1% 1/6W				
R136	1-215-437-00	METAL	4.7K 1% 1/6W				
R137	1-249-425-11	CARBON	4.7K 5% 1/4W				
R138	1-215-455-00	METAL	27K 1% 1/6W				
R139	1-249-405-11	CARBON	100 5% 1/4W				
R140	1-249-437-11	CARBON	47K 5% 1/4W				
R141	1-249-441-11	CARBON	100K 5% 1/4W				
R142	1-247-903-00	CARBON	1M 5% 1/4W				
R143	1-215-409-00	METAL	330 1% 1/6W				
R144	1-215-427-00	METAL	1.8K 1% 1/6W				
R145	1-215-425-00	METAL	1.5K 1% 1/6W				
R149	1-249-420-11	CARBON	1.8K 5% 1/4W				
R150	1-215-427-00	METAL	1.8K 1% 1/6W				
R151	1-249-441-11	CARBON	100K 5% 1/4W				
R152	1-215-459-00	METAL	39K 1% 1/6W				
R153	1-215-433-00	METAL	3.3K 1% 1/6W				
R154	1-215-413-00	METAL	470 1% 1/6W				
R155	1-249-428-11	CARBON	8.2K 5% 1/4W				
R156	1-249-441-11	CARBON	100K 5% 1/4W				
R160	1-215-433-00	METAL	3.3K 1% 1/6W				
R161	1-249-429-11	CARBON	10K 5% 1/4W				
R167	1-215-437-00	METAL	4.7K 1% 1/6W				
R168	1-249-441-11	CARBON	100K 5% 1/4W				
R169	1-215-397-00	METAL	100 1% 1/6W				
R170	1-215-421-00	METAL	1K 1% 1/6W				
R171	1-215-429-00	METAL	2.2K 1% 1/6W				
R172	1-215-421-00	METAL	1K 1% 1/6W				
R173	1-249-441-11	CARBON	100K 5% 1/4W				
R177	1-215-429-00	METAL	2.2K 1% 1/6W				
VARIABLE RESISTOR				CAPACITOR			
RV1	1-237-506-21	RES, ADJ, CERMET 100K		C1	1-123-321-00	ELECT 220MF	20% 16V
RV2	1-237-503-21	RES, ADJ, CERMET 10K		C2	1-123-321-00	ELECT 220MF	20% 16V
*****				C3	1-123-321-00	ELECT 220MF	20% 16V
*A-1345-651-A DB BOARD, COMPLETE				C4	1-123-321-00	ELECT 220MF	20% 16V
*****				C5	1-123-321-00	ELECT 220MF	20% 16V
*1-526-656-00 SOCKET, IC (DP) 20P				C6	1-123-356-00	ELECT 10MF	20% 16V
3-618-225-00 NUT, PLATE				C18	1-101-888-00	CERAMIC 68PF	5% 50V
*4-353-708-00 HOOK, FINGER				C19	1-101-004-00	CERAMIC 0.01MF	50V
4-378-915-01 NUT (M2.6), PLATE				C20	1-101-004-00	CERAMIC 0.01MF	50V
				C21	1-101-888-00	CERAMIC 68PF	5% 50V
				C22	1-101-888-00	CERAMIC 68PF	5% 50V
				C23	1-101-004-00	CERAMIC 0.01MF	50V
				C24	1-101-004-00	CERAMIC 0.01MF	50V
				C25	1-101-888-00	CERAMIC 68PF	5% 50V
				C26	1-101-888-00	CERAMIC 68PF	5% 50V
				C27	1-101-004-00	CERAMIC 0.01MF	50V
				C28	1-101-004-00	CERAMIC 0.01MF	50V
				C29	1-101-888-00	CERAMIC 68PF	5% 50V
				C30	1-101-888-00	CERAMIC 68PF	5% 50V
				C31	1-101-004-00	CERAMIC 0.01MF	50V
				C32	1-101-004-00	CERAMIC 0.01MF	50V
				C33	1-101-888-00	CERAMIC 68PF	5% 50V
				C34	1-101-888-00	CERAMIC 68PF	5% 50V
				C35	1-101-004-00	CERAMIC 0.01MF	50V
				C36	1-101-004-00	CERAMIC 0.01MF	50V
				C37	1-101-888-00	CERAMIC 68PF	5% 50V
				C44	1-101-004-00	CERAMIC 0.01MF	50V
				C45	1-101-004-00	CERAMIC 0.01MF	50V
				C46	1-123-356-00	ELECT 10MF	20% 16V
				C47	1-123-333-00	ELECT 100MF	20% 16V
				C49	1-102-965-00	CERAMIC 39PF	5% 50V
				C50	1-136-165-00	FILM 0.1MF	5% 50V
				C51	1-101-004-00	CERAMIC 0.01MF	50V
				C52	1-101-004-00	CERAMIC 0.01MF	50V
				C53	1-101-004-00	CERAMIC 0.01MF	50V
				C55	1-102-961-00	CERAMIC 27PF	5% 50V
				C56	1-101-004-00	CERAMIC 0.01MF	50V
				C57	1-101-004-00	CERAMIC 0.01MF	50V
				C62	1-101-004-00	CERAMIC 0.01MF	50V
				C63	1-101-004-00	CERAMIC 0.01MF	50V
				C64	1-101-004-00	CERAMIC 0.01MF	50V
				C65	1-101-004-00	CERAMIC 0.01MF	50V
				C66	1-101-004-00	CERAMIC 0.01MF	50V
				C67	1-101-004-00	CERAMIC 0.01MF	50V
				DIODE			
				D1	8-719-971-20	DIODE ERC38-06	
				D2	8-719-971-20	DIODE ERC38-06	
				D5	8-719-971-20	DIODE ERC38-06	
				CONNECTOR			
				DB1	*1-562-729-11	CONNECTOR, MULTI 64P	
				DB2	*1-561-724-00	SOCKET, CONNECTOR 2P	
				DB2	*1-564-431-11	POST, CONNECTOR 3P	
				DB3	*1-561-724-00	SOCKET, CONNECTOR 2P	
				DB3	*1-564-431-11	POST, CONNECTOR 3P	
				IC			
				IC1	8-759-170-08	IC UPC78M08H	
				IC2	8-759-700-22	IC NJM79M08A	

7. ELECTRICAL PARTS LIST

7-34



Ref.No.	Part No.	Description
IC10	8-759-107-33	IC UPC1060C
IC11	8-759-170-08	IC UPC78M08H
IC12	8-759-700-22	IC NJM79M08A
IC13	8-759-202-26	IC TC74HC138P
IC14	8-759-202-26	IC TC74HC138P
IC15	8-759-202-26	IC TC74HC138P
IC16	8-759-202-26	IC TC74HC138P
IC17	8-759-202-26	IC TC74HC138P
IC18	8-759-202-26	IC TC74HC138P
IC19	8-759-202-89	IC TC74HC139P
IC22	8-749-900-14	IC CP2005S
IC23	8-749-900-14	IC CP2005S
IC24	8-749-900-14	IC CP2005S
IC25	8-749-900-14	IC CP2005S
IC27	8-749-900-14	IC CP2005S
IC28	8-749-900-14	IC CP2005S
IC29	8-749-900-14	IC CP2005S
IC30	8-749-900-14	IC CP2005S
IC32	8-749-900-14	IC CP2005S
IC34	8-749-900-14	IC CP2005S
IC35	8-749-900-14	IC CP2005S
IC41	8-749-900-14	IC CP2005S
IC42	8-749-900-14	IC CP2005S

RESISTOR

R7	1-215-431-00	METAL	2.7K	1%	1/6W
R8	1-215-431-00	METAL	2.7K	1%	1/6W
R9	1-215-431-00	METAL	2.7K	1%	1/6W
R10	1-215-431-00	METAL	2.7K	1%	1/6W
R11	1-215-427-00	METAL	1.8K	1%	1/6W
R12	1-215-427-00	METAL	1.8K	1%	1/6W
R13	1-215-431-00	METAL	2.7K	1%	1/6W
R15	1-215-431-00	METAL	2.7K	1%	1/6W
R17	1-215-401-11	METAL	150	1%	1/6W
R18	1-215-419-00	METAL	820	1%	1/6W
R20	1-215-425-00	METAL	1.5K	1%	1/6W
R21	1-215-413-00	METAL	470	1%	1/6W
R22	1-215-431-00	METAL	2.7K	1%	1/6W
R29	1-215-431-00	METAL	2.7K	1%	1/6W
R30	1-215-431-00	METAL	2.7K	1%	1/6W
R31	1-215-431-00	METAL	2.7K	1%	1/6W
R32	1-215-431-00	METAL	2.7K	1%	1/6W
R33	1-215-431-00	METAL	2.7K	1%	1/6W
R35	1-215-431-00	METAL	2.7K	1%	1/6W
R37	1-215-431-00	METAL	2.7K	1%	1/6W
R38	1-215-431-00	METAL	2.7K	1%	1/6W
R39	1-215-401-11	METAL	150	1%	1/6W
R40	1-215-419-00	METAL	820	1%	1/6W
R41	1-215-431-00	METAL	2.7K	1%	1/6W
R42	1-215-425-00	METAL	1.5K	1%	1/6W
R43	1-215-413-00	METAL	470	1%	1/6W
R63	1-215-435-00	METAL	3.9K	1%	1/6W
R64	1-215-435-00	METAL	3.9K	1%	1/6W
R65	1-215-439-00	METAL	5.6K	1%	1/6W
R66	1-215-439-00	METAL	5.6K	1%	1/6W
R67	1-215-395-00	METAL	82	1%	1/6W
R68	1-215-433-00	METAL	3.3K	1%	1/6W
R69	1-215-421-00	METAL	1K	1%	1/6W
R71	1-215-437-00	METAL	4.7K	1%	1/6W
R90	1-215-435-00	METAL	3.9K	1%	1/6W
R91	1-215-435-00	METAL	3.9K	1%	1/6W
R94	1-215-435-00	METAL	3.9K	1%	1/6W
R95	1-215-435-00	METAL	3.9K	1%	1/6W
R96	1-215-433-00	METAL	3.3K	1%	1/6W

Remark	Ref.No.	Part No.	Description	Remark
	R97	1-215-433-00	METAL 3.3K 1%	1/6W
	R98	1-215-441-00	METAL 6.8K 1%	1/6W
	R99	1-215-441-00	METAL 6.8K 1%	1/6W
	R100	1-215-447-00	METAL 12K 1%	1/6W
	R101	1-215-441-00	METAL 6.8K 1%	1/6W
	R102	1-215-441-00	METAL 6.8K 1%	1/6W
	R104	1-215-447-00	METAL 12K 1%	1/6W
	R105	1-215-395-00	METAL 82 1%	1/6W
	R106	1-215-433-00	METAL 3.3K 1%	1/6W
	R107	1-215-437-00	METAL 4.7K 1%	1/6W
	R108	1-215-421-00	METAL 1K 1%	1/6W
	R110	1-215-445-00	METAL 10K 1%	1/6W
	R111	1-215-445-00	METAL 10K 1%	1/6W


*A-1345-778-A E BOARD, COMPLETE

3-701-609-00 BUSHING (B), TR
*4-028-047-01 HEAT SINK, CLIP TYPE
4-303-844-00 SPACER, MICA (4) MD-17
*4-304-469-00 HOLDER
*4-363-147-00 HEAT SINK, H.PIN

*4-363-404-00 HOLDER, IC
4-363-414-00 SPACER, MICA
*4-373-965-01 INSULATOR (SMALL)
*4-373-966-01 INSULATOR (LARGE)

CAPACITOR


C1	1-123-874-00	ELECT	470MF	20%	16V
C2	1-123-024-00	ELECT	33MF		160V
C3	1-124-126-00	ELECT	47MF	20%	25V
C4	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C5	1-102-824-00	CERAMIC	470PF	5%	50V
C6	1-108-690-11	MYLAR	0.0068MF	10%	200V
C7	1-124-046-00	ELECT	10MF		160V
C8	1-102-030-00	CERAMIC	330PF	10%	500V
C9	1-136-161-00	FILM	0.047MF	5%	50V
C10	1-136-090-00	FILM	0.0062MF	3%	2KV
C12	1-124-046-00	ELECT	10MF		160V
C13	1-126-101-11	ELECT	100MF	20%	16V
C14	1-126-101-11	ELECT	100MF	20%	16V
C15	1-108-626-11	MYLAR	0.01MF	10%	100V
C16	1-136-186-00	FILM	2.4MF	5%	200V
C17	1-136-155-00	FILM	0.015MF	5%	50V
C18	1-136-153-00	FILM	0.01MF	5%	50V
C19	1-102-030-00	CERAMIC	330PF	10%	500V
C20	1-136-111-00	FILM	1MF	5%	200V
C21	1-136-161-00	FILM	0.047MF	5%	50V
C22	1-124-448-00	ELECT	1000MF	20%	35V
C23	1-124-799-11	ELECT	2.2MF	20%	160V
C24	1-108-690-11	MYLAR	0.0068MF	10%	200V
C25	1-136-108-00	FILM	0.43MF	5%	200V
C26	1-124-448-00	ELECT	1000MF	20%	35V
C27	1-123-947-00	ELECT	10MF	20%	250V
C28	1-126-174-51	ELECT	10MF	20%	350V
C29	1-108-688-91	MYLAR	0.0047MF	10%	200V
C30	1-162-115-00	CERAMIC	330PF	10%	2KV
C31	1-124-046-00	ELECT	10MF		160V
C32	1-124-126-00	ELECT	47MF	20%	25V
C33	1-123-875-11	ELECT	10MF	20%	50V
C34	1-123-875-11	ELECT	10MF	20%	50V
C35	1-124-801-11	ELECT	4.7MF	20%	160V
C36	1-102-973-00	CERAMIC	100PF	5%	50V


The components identified by shading and mark  are critical for safety.
Replace only with part number specified.


Ref.No.	Part No.	Description			Remark	Ref.No.	Part No.	Description			Remark
C37	1-136-161-00	FILM	0.047MF	5%	50V	C112	1-162-318-11	CERAMIC	0.001MF	10%	500V
C38	1-102-947-00	CERAMIC	10PF	0.5PF	50V	C113	1-162-318-11	CERAMIC	0.001MF	10%	500V
C39	1-124-516-00	ELECT	330MF	20%	50V	C114	1-136-153-00	FILM	0.01MF	5%	50V
C40	1-124-516-00	ELECT	330MF	20%	50V	C115	1-101-004-00	CERAMIC	0.01MF		50V
C41	1-101-004-00	CERAMIC	0.01MF		50V	C116	1-126-101-11	ELECT	100MF	20%	16V
C42	1-130-471-00	MYLAR	0.001MF	5%	50V	C117	1-126-101-11	ELECT	100MF	20%	16V
C43	1-136-161-00	FILM	0.047MF	5%	50V	C118	1-102-971-00	CERAMIC	82PF	5%	50V
C44	1-123-874-00	ELECT	470MF	20%	16V	C119	1-101-004-00	CERAMIC	0.01MF		50V
C45	1-102-228-00	CERAMIC	470PF	10%	500V	C120	1-124-513-11	ELECT	47MF	20%	50V
C46	1-102-038-00	CERAMIC	0.001MF		500V	C121	1-136-153-00	FILM	0.01MF	5%	50V
C47	1-136-080-00	FILM	0.011MF	3%	2KV	C122	1-136-157-00	FILM	0.022MF	5%	50V
C48	1-136-111-00	FILM	1MF	5%	200V	C123	1-124-513-11	ELECT	47MF	20%	50V
C49	1-136-161-00	FILM	0.047MF	5%	50V	C124	1-101-004-00	CERAMIC	0.01MF		50V
C50	1-136-111-00	FILM	1MF	5%	200V	C125	1-123-875-11	ELECT	10MF	20%	50V
C51	1-123-024-00	ELECT	33MF		160V	C126	1-124-443-00	ELECT	100MF	20%	6.3V
C52	1-123-874-00	ELECT	470MF	20%	16V	C127	1-101-004-00	CERAMIC	0.01MF		50V
C53	1-124-634-11	ELECT	1MF	20%	450V	C128	1-101-004-00	CERAMIC	0.01MF		50V
C54	1-124-798-11	ELECT	1MF	20%	160V	C129	1-123-875-11	ELECT	10MF	20%	50V
C55	1-124-798-11	ELECT	1MF	20%	160V	C130	1-124-443-00	ELECT	100MF	20%	6.3V
C56	1-130-473-00	MYLAR	0.0015MF	5%	50V	C133	1-124-126-00	ELECT	47MF	20%	16V
C57	1-136-153-00	FILM	0.01MF	5%	50V	C134	1-124-126-00	ELECT	47MF	20%	16V
C58	1-124-126-00	ELECT	47MF	20%	25V						
C59	1-130-479-00	MYLAR	0.0047MF	5%	50V						
C60	1-136-165-00	FILM	0.1MF	5%	50V			DIODE			
C61	1-101-004-00	CERAMIC	0.01MF		50V						
C62	1-130-471-00	MYLAR	0.001MF	5%	50V	D1	8-719-911-19	DIODE	1SS119		
C63	1-102-973-00	CERAMIC	100PF	5%	50V	D2	8-719-300-76	DIODE	RH-1A		
C64	1-102-824-00	CERAMIC	470PF	5%	50V	D3	8-719-300-76	DIODE	RH-1A		
C65	1-123-875-11	ELECT	10MF	20%	50V	D4	8-719-973-95	DIODE	ERD09-15		
C66	1-123-357-00	ELECT	22MF	20%	50V	D6	8-719-971-20	DIODE	ERC38-06		
C67	1-123-357-00	ELECT	22MF	20%	50V	D7	8-719-971-20	DIODE	ERC38-06		
C68	1-136-165-00	FILM	0.1MF	5%	50V	D8	8-719-911-19	DIODE	1SS119		
C69	1-136-165-00	FILM	0.1MF	5%	50V	D9	8-719-911-19	DIODE	1SS119		
C70	1-123-875-11	ELECT	10MF	20%	50V	D10	8-719-911-19	DIODE	1SS119		
C71	1-124-043-91	ELECT	2.2MF	20%	50V	D11	8-719-911-19	DIODE	1SS119		
C72	1-102-824-00	CERAMIC	470PF	5%	50V	D12	8-719-911-19	DIODE	1SS119		
C73	1-136-171-00	FILM	0.33MF	5%	50V	D13	8-719-300-76	DIODE	RH-1A		
C74	1-124-124-00	ELECT	220MF	20%	10V	D14	8-719-300-76	DIODE	RH-1A		
C75	1-101-004-00	CERAMIC	0.01MF		50V	D15	8-719-000-28	THYRISTOR	CRO2AM-8		
C76	1-126-101-11	ELECT	100MF	20%	16V	D16	8-719-931-04	DIODE	ERD31-04		
C77	1-124-036-00	ELECT	330MF	20%	16V	D17	8-719-931-04	DIODE	ERD31-04		
C78	1-124-045-00	ELECT	4.7MF	20%	50V	D18	8-719-971-20	DIODE	ERC38-06		
C79	1-108-638-11	MYLAR	0.1MF	10%	100V	D19	8-719-971-20	DIODE	ERC38-06		
C80	1-124-791-11	ELECT	1MF	20%	50V	D20	8-719-971-20	DIODE	ERC38-06		
C81	1-124-126-00	ELECT	47MF	20%	16V	D21	8-719-911-19	DIODE	1SS119		
C82	1-102-110-00	CERAMIC	220PF	10%	50V	D22	8-719-911-19	DIODE	1SS119		
C83	1-136-165-00	FILM	0.1MF	5%	50V	D23	8-719-911-19	DIODE	1SS119		
C84	1-124-041-91	ELECT	220MF	20%	16V	D24	8-719-911-19	DIODE	1SS119		
C85	1-136-165-00	FILM	0.1MF	5%	50V	D25	8-719-911-19	DIODE	1SS119		
C87	1-136-165-00	FILM	0.1MF	5%	50V	D26	8-719-931-04	DIODE	ERD31-04		
C88	1-136-165-00	FILM	0.1MF	5%	50V	D27	8-719-931-04	DIODE	ERD31-04		
C90	1-108-694-81	MYLAR	0.015MF	10%	200V	D28	8-719-300-76	DIODE	RH-1A		
C95	1-106-371-00	MYLAR	0.015MF	10%	100V	D29	8-719-928-08	DIODE	ERD28-08S		
C97	1-124-646-00	ELECT	22MF	20%	16V	D30	8-719-928-08	DIODE	ERD28-08S		
C98	1-136-319-11	FILM	0.0033MF	3%	2KV	D31	8-719-931-04	DIODE	ERD31-04		
C100	1-129-715-00	FILM	0.012MF	10%	630V	D32	8-719-901-19	DIODE	V11N		
C101	1-136-179-00	FILM	1.5MF	5%	200V	D33	8-759-157-40	IC	UPC574J		
C102	1-136-105-00	FILM	0.33MF	5%	200V	D34	8-759-157-40	IC	UPC574J		
C103	1-130-479-00	MYLAR	0.0047MF	5%	50V	D35	8-759-157-40	IC	UPC574J		
C104	1-130-479-00	MYLAR	0.0047MF	5%	50V	D36	8-759-157-40	IC	UPC574J		
C105	1-124-801-11	ELECT	4.7MF	20%	160V	D37	8-719-911-19	DIODE	1SS119		
C106	1-124-046-00	ELECT	10MF		160V	D38	8-719-911-19	DIODE	1SS119		
C107	1-136-117-00	FILM	2MF	5%	200V	D39	8-759-157-40	IC	UPC574J		
C108	1-124-126-00	ELECT	47MF	20%	16V	D40	A.	IC			
C110	1-124-126-00	ELECT	47MF	20%	16V	D41	8-719-911-19	DIODE	1SS119		

7-37


E

- The components identified by  in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

Les composants identifiés par une trame et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifique.

The components identified by shading and mark  are critical for safety. Replace only with part number specified.

Ref.No.	Part No.	Description				Remark	Ref.No.	Part No.	Description				Remark
R4	1-249-413-11	CARBON	470	5%	1/4W		R70	1-215-453-00	METAL	22K	1%	1/6W	
R5	1-249-417-11	CARBON	1K	5%	1/4W		R71	1-215-429-00	METAL	2.2K	1%	1/6W	
R6	1-249-417-11	CARBON	1K	5%	1/4W		R72	1-247-688-11	CARBON	10	5%	1/4W	F
R7	1-215-875-11	METAL OXIDE	10K	5%	1W	F	R73	1-247-688-11	CARBON	10	5%	1/4W	F
R8	1-215-876-00	METAL OXIDE	15K	5%	1W	F	R74	1-247-688-11	CARBON	10	5%	1/4W	F
R9	1-214-892-00	METAL	15K	1%	1/2W		R75	1-249-423-11	CARBON	3.3K	5%	1/4W	
R10	1-214-892-00	METAL	15K	1%	1/2W		R76	1-249-425-11	CARBON	4.7K	5%	1/4W	
R11	1-215-437-00	METAL	4.7K	1%	1/6W		R77	1-249-417-11	CARBON	1K	5%	1/4W	
R12	1-249-401-11	CARBON	47	5%	1/4W		R78	1-215-437-00	METAL	4.7K	1%	1/6W	
R14	1-249-417-11	CARBON	1K	5%	1/4W		R79	1-215-437-00	METAL	4.7K	1%	1/6W	
R15	1-215-894-11	METAL OXIDE	2.2K	5%	2W	F	R80	1-249-417-11	CARBON	1K	5%	1/4W	
R16	1-215-871-11	METAL OXIDE	2.2K	5%	1W	F	R81	1-249-417-11	CARBON	1K	5%	1/4W	
R17	1-207-451-00	WIREWOUND	0.1	10%	1/2W		R82	1-249-405-11	CARBON	100	5%	1/4W	
R18	1-249-389-11	CARBON	4.7	5%	1/4W	F	R83	1-249-421-11	CARBON	2.2K	5%	1/4W	
R19	1-249-382-11	CARBON	1.2	5%	1/4W	F	R84	1-249-426-11	CARBON	5.6K	5%	1/4W	
R20	1-249-382-11	CARBON	1.2	5%	1/4W	F	R85	1-249-452-11	CARBON	2.7	5%	1/4W	F
R21	1-249-417-11	CARBON	1K	5%	1/4W		R86	1-249-452-11	CARBON	2.7	5%	1/4W	F
R22	1-249-417-11	CARBON	1K	5%	1/4W		R87	1-215-863-11	METAL OXIDE	100	5%	1W	F
R23	1-216-357-00	METAL OXIDE	4.7	5%	1W	F	R88	1-216-349-00	METAL OXIDE	1	5%	1W	F
R24	1-216-357-00	METAL OXIDE	4.7	5%	1W	F	R89	1-216-353-00	METAL OXIDE	2.2	5%	1W	F
R25	1-215-865-11	METAL OXIDE	220	5%	1W	F	R90	1-216-353-00	METAL OXIDE	2.2	5%	1W	F
R26	1-216-478-11	METAL OXIDE	390	5%	3W	F	R91	1-247-881-00	CARBON	120K	5%	1/4W	
R27	1-249-423-11	CARBON	3.3K	5%	1/4W		R92	1-249-425-11	CARBON	4.7K	5%	1/4W	
R28	1-249-425-11	CARBON	4.7K	5%	1/4W		R93	1-249-417-11	CARBON	1K	5%	1/4W	
R29	1-249-419-11	CARBON	1.5K	5%	1/4W		R94	1-249-421-11	CARBON	2.2K	5%	1/4W	
R30	1-215-437-00	METAL	4.7K	1%	1/6W		R95	1-249-429-11	CARBON	10K	5%	1/4W	
R31	1-215-445-00	METAL	10K	1%	1/6W		R96	1-249-417-11	CARBON	1K	5%	1/4W	
R32	1-249-417-11	CARBON	1K	5%	1/4W		R97	1-249-421-11	CARBON	2.2K	5%	1/4W	
R33	1-249-417-11	CARBON	1K	5%	1/4W		R98	1-249-421-11	CARBON	2.2K	5%	1/4W	
R34	1-215-437-00	METAL	4.7K	1%	1/6W		R99	1-249-421-11	CARBON	2.2K	5%	1/4W	
R35	1-249-406-11	CARBON	120	5%	1/4W		R100	1-249-400-11	CARBON	39	5%	1/4W	
R36	1-215-900-11	METAL OXIDE	22K	5%	2W	F	R101	1-249-417-11	CARBON	1K	5%	1/4W	
R37	1-249-405-11	CARBON	100	5%	1/4W		R102	1-215-857-11	METAL OXIDE	10	5%	1W	F
R38	1-249-377-11	CARBON	0.47	5%	1/4W	F	R103	1-249-421-11	CARBON	2.2K	5%	1/4W	
R39	1-249-377-11	CARBON	0.47	5%	1/4W	F	R104	1-216-350-11	METAL OXIDE	1.2	5%	1W	F
R40	1-249-417-11	CARBON	1K	5%	1/4W		R105	1-215-860-11	METAL OXIDE	33	5%	1W	F
R41	1-249-413-11	CARBON	470	5%	1/4W		R106	1-215-863-11	METAL OXIDE	100	5%	1W	F
R42	1-216-349-00	METAL OXIDE	1	5%	1W	F	R107	1-215-863-11	METAL OXIDE	100	5%	1W	F
R43	1-215-859-00	METAL OXIDE	22	5%	1W	F	R108	1-216-345-11	METAL OXIDE	0.47	5%	1W	F
R44	1-215-870-11	METAL OXIDE	1.5K	5%	1W	F	R109	1-215-869-11	METAL OXIDE	1K	5%	1W	F
R45	1-215-869-11	METAL OXIDE	1K	5%	1W	F	R110	1-215-879-91	METAL OXIDE	47K	5%	1W	F
R46	1-216-454-11	METAL OXIDE	390	5%	2W	F	R111	1-216-461-00	METAL OXIDE	5.6K	5%	2W	F
R47	1-215-869-11	METAL OXIDE	1K	5%	1W	F	R112	1-249-405-11	CARBON	100	5%	1/4W	
R48	1-215-425-00	METAL	1.5K	1%	1/6W		R113	1-249-429-11	CARBON	10K	5%	1/4W	
R49	1-216-349-00	METAL OXIDE	1	5%	1W	F	✖R114 △		METAL			1/6W	
R50	1-215-437-00	METAL	4.7K	1%	1/6W		✖R115 △		METAL			1/6W	
R51	1-216-349-00	METAL OXIDE	1	5%	1W	F	R116	1-215-445-00	METAL	10K	1%	1/6W	
R52	1-249-429-11	CARBON	10K	5%	1/4W		R117	1-249-421-11	CARBON	2.2K	5%	1/4W	
R53	1-247-902-11	CARBON	910K	5%	1/4W		R118	1-249-429-11	CARBON	10K	5%	1/4W	
R54	1-247-883-00	CARBON	150K	5%	1/4W		R119	1-247-883-00	CARBON	150K	5%	1/4W	
R55	1-249-433-11	CARBON	22K	5%	1/4W		R120	1-249-417-11	CARBON	1K	5%	1/4W	
R56	1-249-420-11	CARBON	1.8K	5%	1/4W		R121	1-249-425-11	CARBON	4.7K	5%	1/4W	
R57	1-249-421-11	CARBON	2.2K	5%	1/4W	F	R122	1-249-421-11	CARBON	2.2K	5%	1/4W	
R58	1-249-429-11	CARBON	10K	5%	1/4W		R123	1-249-433-11	CARBON	22K	5%	1/4W	
R59	1-249-425-11	CARBON	4.7K	5%	1/4W		R124	1-249-421-11	CARBON	2.2K	5%	1/4W	
R60	1-249-417-11	CARBON	1K	5%	1/4W		R125	1-249-441-11	CARBON	100K	5%	1/4W	
R61	1-249-418-11	CARBON	1.2K	5%	1/4W		R126	1-249-425-11	CARBON	4.7K	5%	1/4W	
R62	1-215-863-11	METAL OXIDE	100	5%	1W	F	R127	1-249-425-11	CARBON	4.7K	5%	1/4W	
R63	1-215-421-00	METAL	1K	1%	1/6W		R128	1-249-429-11	CARBON	10K	5%	1/4W	
R64	1-215-445-00	METAL	10K	1%	1/6W		R129	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R65	1-249-420-11	CARBON	1.8K	5%	1/4W		R130	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R66	1-215-878-00	METAL OXIDE	33K	5%	1W	F	R131	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R67	1-249-401-11	CARBON	47	5%	1/4W		R132	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R68	1-249-425-11	CARBON	4.7K	5%	1/4W		R133	1-249-417-11	CARBON	1K	5%	1/4W	
R69	1-215-461-00	METAL	47K	1%	1/6W		R134 △	1-215-433-91	METAL	3.3K	1%	1/6W	

Les composants identifiés par une trame et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifique.

ED

7. ELECTRICAL PARTS LIST

D

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
C11	1-136-153-00	FILM	0.01MF 5% 50V	C89	1-136-153-00	FILM	0.01MF 5% 50V
C12	1-126-157-11	ELECT	10MF 20% 16V	C90	1-136-161-00	FILM	0.047MF 5% 50V
C13	1-136-157-00	FILM	0.022MF 5% 50V	C91	1-124-589-11	ELECT	47MF 20% 16V
C14	1-124-257-00	ELECT	2.2MF 20% 50V	C92	1-124-589-11	ELECT	47MF 20% 16V
C15	1-130-020-91	FILM	0.0015MF 5% 50V	C100	1-126-157-11	ELECT	10MF 20% 16V
C16	1-136-173-00	FILM	0.47MF 5% 50V	C101	1-130-473-00	MYLAR	0.0015MF 5% 50V
C17	1-126-157-11	ELECT	10MF 20% 16V	C103	1-124-589-11	ELECT	47MF 20% 16V
C18	1-136-157-00	FILM	0.022MF 5% 50V	C104	1-102-074-00	CERAMIC	0.001MF 10% 50V
C19	1-124-589-11	ELECT	47MF 20% 16V	C105	1-136-161-00	FILM	0.047MF 5% 50V
C20	1-124-589-11	ELECT	47MF 20% 16V	C106	1-102-978-00	CERAMIC	220PF 5% 50V
C21	1-124-589-11	ELECT	47MF 20% 16V	C107	1-136-161-00	FILM	0.047MF 5% 50V
C22	1-124-589-11	ELECT	47MF 20% 16V	C108	1-136-161-00	FILM	0.047MF 5% 50V
C23	1-101-004-00	CERAMIC	0.01MF 50V	C109	1-102-820-00	CERAMIC	330PF 5% 50V
C24	1-136-153-00	FILM	0.01MF 5% 50V	C110	1-136-161-00	FILM	0.047MF 5% 50V
C25	1-124-589-11	ELECT	47MF 20% 16V	C111	1-130-473-00	MYLAR	0.0015MF 5% 50V
C29	1-136-474-11	FILM	0.1MF 5% 100V	C112	1-101-880-00	CERAMIC	47PF 5% 50V
C30	1-136-153-00	FILM	0.01MF 5% 50V	C113	1-102-074-00	CERAMIC	0.001MF 10% 50V
C31	1-136-153-00	FILM	0.01MF 5% 50V	C114	1-136-161-00	FILM	0.047MF 5% 50V
C33	1-124-589-11	ELECT	47MF 20% 16V	C115	1-102-978-00	CERAMIC	220PF 5% 50V
C34	1-124-589-11	ELECT	47MF 20% 16V	C116	1-136-161-00	FILM	0.047MF 5% 50V
C35	1-101-004-00	CERAMIC	0.01MF 50V	C117	1-136-161-00	FILM	0.047MF 5% 50V
C41	1-136-153-00	FILM	0.01MF 5% 50V	C118	1-102-820-00	CERAMIC	330PF 5% 50V
C43	1-136-161-00	FILM	0.047MF 5% 50V	C119	1-136-161-00	FILM	0.047MF 5% 50V
C44	1-101-004-00	CERAMIC	0.01MF 50V	C120	1-130-473-00	MYLAR	0.0015MF 5% 50V
C45	1-102-973-00	CERAMIC	100PF 5% 50V	C121	1-101-880-00	CERAMIC	47PF 5% 50V
C46	1-102-973-00	CERAMIC	100PF 5% 50V	C122	1-124-589-11	ELECT	47MF 20% 16V
C47	1-101-004-00	CERAMIC	0.01MF 50V	C123	1-124-589-11	ELECT	47MF 20% 16V
C48	1-130-471-00	MYLAR	0.001MF 5% 50V	C124	1-101-004-00	CERAMIC	0.01MF 50V
C49	1-123-611-00	ELECT	1MF 20% 50V	C125	1-101-004-00	CERAMIC	0.01MF 50V
C50	1-102-973-00	CERAMIC	100PF 5% 50V	C134	1-102-074-00	CERAMIC	0.001MF 10% 50V
C51	1-130-471-00	MYLAR	0.001MF 5% 50V	C135	1-136-161-00	FILM	0.047MF 5% 50V
C52	1-124-589-11	ELECT	47MF 20% 16V	C136	1-102-978-00	CERAMIC	220PF 5% 50V
C53	1-102-824-00	CERAMIC	470PF 5% 50V	C138	1-136-161-00	FILM	0.047MF 5% 50V
C54	1-102-114-00	CERAMIC	470PF 10% 50V	C139	1-136-161-00	FILM	0.047MF 5% 50V
C55	1-123-611-00	ELECT	1MF 20% 50V	C140	1-102-074-00	CERAMIC	0.001MF 10% 50V
C56	1-123-611-00	ELECT	1MF 20% 50V	C141	1-136-161-00	FILM	0.047MF 5% 50V
C57	1-102-973-00	CERAMIC	100PF 5% 50V	C142	1-102-973-00	CERAMIC	100PF 5% 50V
C58	1-102-973-00	CERAMIC	100PF 5% 50V	C143	1-130-473-00	MYLAR	0.0015MF 5% 50V
C60	1-124-589-11	ELECT	47MF 20% 16V	C145	1-101-880-00	CERAMIC	47PF 5% 50V
C62	1-126-157-11	ELECT	10MF 20% 16V	C146	1-102-074-00	CERAMIC	0.001MF 10% 50V
C63	1-136-153-00	FILM	0.01MF 5% 50V	C148	1-102-978-00	CERAMIC	220PF 5% 50V
C64	1-101-361-00	CERAMIC	150PF 5% 50V	C149	1-102-074-00	CERAMIC	0.001MF 10% 50V
C65	1-101-004-00	CERAMIC	0.01MF 50V	C150	1-124-589-11	ELECT	47MF 20% 16V
C67	1-136-153-00	FILM	0.01MF 5% 50V	C151	1-124-589-11	ELECT	47MF 20% 16V
C68	1-102-973-00	CERAMIC	100PF 5% 50V	C152	1-124-589-11	ELECT	47MF 20% 16V
C69	1-102-973-00	CERAMIC	100PF 5% 50V	C153	1-136-161-00	FILM	0.047MF 5% 50V
C70	1-130-471-00	MYLAR	0.001MF 5% 50V	C154	1-136-161-00	FILM	0.047MF 5% 50V
C71	1-136-153-00	FILM	0.01MF 5% 50V	C155	1-102-824-00	CERAMIC	470PF 5% 50V
C72	1-102-973-00	CERAMIC	100PF 5% 50V	C156	1-136-161-00	FILM	0.047MF 5% 50V
C73	1-130-475-00	MYLAR	0.0022MF 5% 50V	C157	1-130-473-00	MYLAR	0.0015MF 5% 50V
C74	1-136-153-00	FILM	0.01MF 5% 50V	C158	1-101-880-00	CERAMIC	47PF 5% 50V
C75	1-102-978-00	CERAMIC	220PF 5% 50V	C159	1-126-157-11	ELECT	10MF 20% 16V
C76	1-101-361-00	CERAMIC	150PF 5% 50V	C160	1-126-157-11	ELECT	10MF 20% 16V
C77	1-124-589-11	ELECT	47MF 20% 16V	C161	1-136-161-00	FILM	0.047MF 5% 50V
C78	1-136-161-00	FILM	0.047MF 5% 50V	C165	1-136-165-00	FILM	0.1MF 5% 50V
C79	1-136-165-00	FILM	0.1MF 5% 50V	C167	1-124-589-11	ELECT	47MF 20% 16V
C80	1-124-589-11	ELECT	47MF 20% 16V	C180	1-124-589-11	ELECT	47MF 20% 16V
C81	1-136-153-00	FILM	0.01MF 5% 50V	C181	1-124-589-11	ELECT	47MF 20% 16V
C82	1-136-157-00	FILM	0.022MF 5% 50V	C201	1-102-824-00	CERAMIC	470PF 5% 50V
C83	1-136-165-00	FILM	0.1MF 5% 50V	C202	1-101-001-00	CERAMIC	0.001MF 50V
C84	1-136-153-00	FILM	0.01MF 5% 50V	C203	1-101-001-00	CERAMIC	0.001MF 50V
C85	1-136-161-00	FILM	0.047MF 5% 50V	C204	1-101-001-00	CERAMIC	0.001MF 50V
C86	1-136-157-00	FILM	0.022MF 5% 50V	C205	1-101-001-00	CERAMIC	0.001MF 50V
C87	1-136-165-00	FILM	0.1MF 5% 50V	C206	1-101-001-00	CERAMIC	0.001MF 50V
C88	1-124-589-11	ELECT	47MF 20% 16V	C207	1-102-978-00	CERAMIC	220PF 5% 50V

7-41

D

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
Q19	8-729-178-55	TRANSISTOR 2SC2785-E		Q111	8-729-900-36	TRANSISTOR DTC124ES	
Q20	8-729-178-55	TRANSISTOR 2SC2785-E		Q112	8-729-900-36	TRANSISTOR DTC124ES	
Q21	8-729-178-55	TRANSISTOR 2SC2785-E		Q113	8-729-900-36	TRANSISTOR DTC124ES	
Q22	8-729-201-04	TRANSISTOR 2SC2878		Q114	8-729-178-55	TRANSISTOR 2SC2785-E	
Q23	8-729-201-04	TRANSISTOR 2SC2878		Q115	8-729-178-55	TRANSISTOR 2SC2785-E	
Q24	8-729-201-04	TRANSISTOR 2SC2878		Q116	8-729-900-36	TRANSISTOR DTC124ES	
Q25	8-729-178-55	TRANSISTOR 2SC2785-E		Q117	8-729-178-55	TRANSISTOR 2SC2785-E	
Q26	8-729-178-55	TRANSISTOR 2SC2785-E		Q118	8-729-117-54	TRANSISTOR 2SA1175	
Q27	8-729-178-55	TRANSISTOR 2SC2785-E		Q119	8-729-178-55	TRANSISTOR 2SC2785-E	
Q28	8-729-178-55	TRANSISTOR 2SC2785-E		Q120	8-729-178-55	TRANSISTOR 2SC2785-E	
Q29	8-729-178-55	TRANSISTOR 2SC2785-E		Q121	8-729-900-36	TRANSISTOR DTC124ES	
Q30	8-729-178-55	TRANSISTOR 2SC2785-E		RESISTOR			
Q31	8-729-178-55	TRANSISTOR 2SC2785-E		R1	1-249-425-11	CARBON 4.7K 5%	1/4W
Q32	8-729-178-55	TRANSISTOR 2SC2785-E		R2	1-249-431-11	CARBON 15K 5%	1/4W
Q33	8-729-178-55	TRANSISTOR 2SC2785-E		R3	1-249-417-11	CARBON 1K 5%	1/4W
Q34	8-729-178-55	TRANSISTOR 2SC2785-E		R4	1-249-425-11	CARBON 4.7K 5%	1/4W
Q35	8-729-900-36	TRANSISTOR DTC124ES		R5	1-249-431-11	CARBON 15K 5%	1/4W
Q36	8-729-178-55	TRANSISTOR 2SC2785-E		R6	1-215-421-00	METAL 1K 1%	1/6W
Q37	8-729-178-55	TRANSISTOR 2SC2785-E		R7	1-215-437-00	METAL 4.7K 1%	1/6W
Q38	8-729-105-73	TRANSISTOR 2SK523-L2		R8	1-215-437-00	METAL 4.7K 1%	1/6W
Q39	8-729-900-36	TRANSISTOR DTC124ES		R10	1-249-417-11	CARBON 1K 5%	1/4W
Q40	8-729-178-55	TRANSISTOR 2SC2785-E		R12	1-247-895-00	CARBON 470K 5%	1/4W
Q41	8-729-105-73	TRANSISTOR 2SK523-L2		R13	1-249-417-11	CARBON 1K 5%	1/4W
Q42	8-729-900-36	TRANSISTOR DTC124ES		R14	1-215-449-00	METAL 15K 1%	1/6W
Q43	8-729-178-55	TRANSISTOR 2SC2785-E		R15	1-249-429-11	CARBON 10K 5%	1/4W
Q44	8-729-201-04	TRANSISTOR 2SC2878		R16	1-249-417-11	CARBON 1K 5%	1/4W
Q45	8-729-201-04	TRANSISTOR 2SC2878		R17	1-249-426-11	CARBON 5.6K 5%	1/4W
Q49	8-729-201-04	TRANSISTOR 2SC2878		R18	1-249-417-11	CARBON 1K 5%	1/4W
Q50	8-729-201-04	TRANSISTOR 2SC2878		R19	1-249-429-11	CARBON 10K 5%	1/4W
Q51	8-729-201-04	TRANSISTOR 2SC2878		R20	1-249-430-11	CARBON 12K 5%	1/4W
Q52	8-729-178-55	TRANSISTOR 2SC2785-E		R21	1-249-430-11	CARBON 12K 5%	1/4W
Q53	8-729-178-55	TRANSISTOR 2SC2785-E		R22	1-249-440-11	CARBON 82K 5%	1/4W
Q54	8-729-105-73	TRANSISTOR 2SK523-L2		R23	1-249-433-11	CARBON 22K 5%	1/4W
Q55	8-729-201-04	TRANSISTOR 2SC2878		R24	1-249-440-11	CARBON 82K 5%	1/4W
Q56	8-729-178-55	TRANSISTOR 2SC2785-E		R25	1-249-423-11	CARBON 3.3K 5%	1/4W
Q57	8-729-178-55	TRANSISTOR 2SC2785-E		R26	1-249-429-11	CARBON 10K 5%	1/4W
Q58	8-729-105-73	TRANSISTOR 2SK523-L2		R27	1-247-868-11	CARBON 36K 5%	1/4W
Q59	8-729-178-55	TRANSISTOR 2SC2785-E		R28	1-249-429-11	CARBON 10K 5%	1/4W
Q60	8-729-117-54	TRANSISTOR 2SA1175		R29	1-249-437-11	CARBON 47K 5%	1/4W
Q61	8-729-201-04	TRANSISTOR 2SC2878		R30	1-249-429-11	CARBON 10K 5%	1/4W
Q63	8-729-178-55	TRANSISTOR 2SC2785-E		R31	1-249-429-11	CARBON 10K 5%	1/4W
Q64	8-729-117-54	TRANSISTOR 2SA1175		R32	1-249-417-11	CARBON 1K 5%	1/4W
Q65	8-729-178-55	TRANSISTOR 2SC2785-E		R33	1-249-429-11	CARBON 10K 5%	1/4W
Q66	8-729-178-55	TRANSISTOR 2SC2785-E		R34	1-249-433-11	CARBON 22K 5%	1/4W
Q68	8-729-178-55	TRANSISTOR 2SC2785-E		R35	1-249-429-11	CARBON 10K 5%	1/4W
Q69	8-729-201-04	TRANSISTOR 2SC2878		R36	1-249-429-11	CARBON 10K 5%	1/4W
Q70	8-729-178-55	TRANSISTOR 2SC2785-E		R37	1-249-425-11	CARBON 4.7K 5%	1/4W
Q71	8-729-178-55	TRANSISTOR 2SC2785-E		R38	1-249-417-11	CARBON 1K 5%	1/4W
Q72	8-729-105-73	TRANSISTOR 2SK523-L2		R39	1-249-417-11	CARBON 1K 5%	1/4W
Q73	8-729-201-04	TRANSISTOR 2SC2878		R40	1-249-417-11	CARBON 1K 5%	1/4W
Q74	8-729-178-55	TRANSISTOR 2SC2785-E		R43	1-249-417-11	CARBON 1K 5%	1/4W
Q75	8-729-178-55	TRANSISTOR 2SC2785-E		R44	1-249-429-11	CARBON 10K 5%	1/4W
Q76	8-729-105-73	TRANSISTOR 2SK523-L2		R45	1-249-417-11	CARBON 1K 5%	1/4W
Q77	8-729-900-36	TRANSISTOR DTC124ES		R46	1-249-429-11	CARBON 10K 5%	1/4W
Q80	8-729-201-04	TRANSISTOR 2SC2878		R50	1-249-417-11	CARBON 1K 5%	1/4W
Q81	8-729-178-55	TRANSISTOR 2SC2785-E		R51	1-249-429-11	CARBON 10K 5%	1/4W
Q82	8-729-178-55	TRANSISTOR 2SC2785-E		R52	1-249-413-11	CARBON 470 5%	1/4W
Q102	8-729-900-36	TRANSISTOR DTC124ES		R53	1-249-417-11	CARBON 1K 5%	1/4W
Q103	8-729-900-36	TRANSISTOR DTC124ES		R59	1-249-417-11	CARBON 1K 5%	1/4W
Q105	8-729-900-36	TRANSISTOR DTC124ES		R60	1-215-447-00	METAL 12K 1%	1/6W
Q106	8-729-900-63	TRANSISTOR DTA124ES		R61	1-215-445-00	METAL 10K 1%	1/6W
Q107	8-729-900-63	TRANSISTOR DTA124ES		R62	1-215-445-00	METAL 10K 1%	1/6W
Q108	8-729-900-63	TRANSISTOR DTA124ES		R63	1-215-461-00	METAL 47K 1%	1/6W
Q109	8-729-178-55	TRANSISTOR 2SC2785-E		R64	1-249-435-11	CARBON 33K 5%	1/4W
Q110	8-729-117-54	TRANSISTOR 2SA1175		R65	1-249-433-11	CARBON 22K 5%	1/4W
				R66	1-249-405-11	CARBON 100 5%	1/4W

D

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R67	1-215-445-00	METAL	10K 1% 1/6W	R144	1-249-429-11	CARBON	10K 5% 1/4W
R68	1-249-429-11	CARBON	10K 5% 1/4W	R145	1-249-423-11	CARBON	3.3K 5% 1/4W
R69	1-215-445-00	METAL	10K 1% 1/6W	R146	1-215-461-00	METAL	47K 1% 1/6W
R70	1-215-459-00	METAL	39K 1% 1/6W	R147	1-249-429-11	CARBON	10K 5% 1/4W
R71	1-215-459-00	METAL	39K 1% 1/6W	R148	1-249-433-11	CARBON	22K 5% 1/4W
R72	1-249-429-11	CARBON	10K 5% 1/4W	R149	1-249-429-11	CARBON	10K 5% 1/4W
R73	1-215-483-00	METAL	390K 1% 1/6W	R150	1-249-429-11	CARBON	10K 5% 1/4W
R74	1-249-437-11	CARBON	47K 5% 1/4W	R151	1-215-441-00	METAL	6.8K 1% 1/6W
R75	1-249-441-11	CARBON	100K 5% 1/4W	R152	1-249-433-11	CARBON	22K 5% 1/4W
R77	1-249-433-11	CARBON	22K 5% 1/4W	R153	1-215-457-00	METAL	33K 1% 1/6W
R79	1-215-459-00	METAL	39K 1% 1/6W	R154	1-215-453-00	METAL	22K 1% 1/6W
R80	1-215-459-00	METAL	39K 1% 1/6W	R155	1-215-453-00	METAL	22K 1% 1/6W
R81	1-215-481-00	METAL	330K 1% 1/6W	R156	1-215-469-00	METAL	100K 1% 1/6W
R82	1-249-437-11	CARBON	47K 5% 1/4W	R157	1-249-429-11	CARBON	10K 5% 1/4W
R83	1-247-893-11	CARBON	390K 5% 1/4W	R158	1-249-417-11	CARBON	1K 5% 1/4W
R84	1-249-429-11	CARBON	10K 5% 1/4W	R159	1-249-433-11	CARBON	22K 5% 1/4W
R85	1-249-441-11	CARBON	100K 5% 1/4W	R160	1-249-437-11	CARBON	47K 5% 1/4W
R86	1-249-433-11	CARBON	22K 5% 1/4W	R161	1-249-425-11	CARBON	4.7K 5% 1/4W
R88	1-215-445-00	METAL	10K 1% 1/6W	R162	1-215-445-00	METAL	10K 1% 1/6W
R89	1-215-469-00	METAL	100K 1% 1/6W	R163	1-249-407-11	CARBON	150 5% 1/4W
R90	1-215-445-00	METAL	10K 1% 1/6W	R164	1-249-417-11	CARBON	1K 5% 1/4W
R92	1-215-445-00	METAL	10K 1% 1/6W	R165	1-249-401-11	CARBON	47 5% 1/4W
R93	1-215-459-00	METAL	39K 1% 1/6W	R166	1-249-430-11	CARBON	12K 5% 1/4W
R94	1-215-431-00	METAL	2.7K 1% 1/6W	R167	1-249-401-11	CARBON	47 5% 1/4W
R96	1-249-429-11	CARBON	10K 5% 1/4W	R168	1-249-417-11	CARBON	1K 5% 1/4W
R97	1-249-433-11	CARBON	22K 5% 1/4W	R169	1-249-425-11	CARBON	4.7K 5% 1/4W
R98	1-215-445-00	METAL	10K 1% 1/6W	R170	1-249-425-11	CARBON	4.7K 5% 1/4W
R99	1-215-449-00	METAL	15K 1% 1/6W	R171	1-249-417-11	CARBON	1K 5% 1/4W
R047	1-215-453-00	METAL	22K 1% 1/6W	R172	1-249-417-11	CARBON	1K 5% 1/4W
R100	1-215-459-00	METAL	39K 1% 1/6W	R173	1-249-429-11	CARBON	10K 5% 1/4W
R101	1-249-417-11	CARBON	1K 5% 1/4W	R174	1-249-425-11	CARBON	4.7K 5% 1/4W
R102	1-215-445-00	METAL	10K 1% 1/6W	R175	1-249-420-11	CARBON	1.8K 5% 1/4W
R103	1-249-437-11	CARBON	47K 5% 1/4W	R176	1-249-420-11	CARBON	1.8K 5% 1/4W
R104	1-215-445-00	METAL	10K 1% 1/6W	R178	1-249-425-11	CARBON	4.7K 5% 1/4W
R105	1-249-429-11	CARBON	10K 5% 1/4W	R179	1-249-429-11	CARBON	10K 5% 1/4W
R106	1-215-445-00	METAL	10K 1% 1/6W	R180	1-249-429-11	CARBON	10K 5% 1/4W
R107	1-215-461-00	METAL	47K 1% 1/6W	R181	1-249-417-11	CARBON	1K 5% 1/4W
R108	1-215-461-00	METAL	47K 1% 1/6W	R186	1-249-417-11	CARBON	1K 5% 1/4W
R109	1-215-485-00	METAL	470K 1% 1/6W	R187	1-249-425-11	CARBON	4.7K 5% 1/4W
R110	1-249-437-11	CARBON	47K 5% 1/4W	R190	1-249-423-11	CARBON	3.3K 5% 1/4W
R111	1-249-429-11	CARBON	10K 5% 1/4W	R191	1-249-429-11	CARBON	10K 5% 1/4W
R112	1-249-441-11	CARBON	100K 5% 1/4W	R192	1-249-429-11	CARBON	10K 5% 1/4W
R113	1-215-465-00	METAL	68K 1% 1/6W	R194	1-249-425-11	CARBON	4.7K 5% 1/4W
R116	1-215-421-00	METAL	1K 1% 1/6W	R195	1-249-425-11	CARBON	4.7K 5% 1/4W
R117	1-215-413-00	METAL	470 1% 1/6W	R196	1-249-421-11	CARBON	2.2K 5% 1/4W
R118	1-249-437-11	CARBON	47K 5% 1/4W	R197	1-249-429-11	CARBON	10K 5% 1/4W
R119	1-249-441-11	CARBON	100K 5% 1/4W	R198	1-249-420-11	CARBON	1.8K 5% 1/4W
R120	1-215-449-00	METAL	15K 1% 1/6W	R199	1-249-420-11	CARBON	1.8K 5% 1/4W
R121	1-215-449-00	METAL	15K 1% 1/6W	R200	1-249-429-11	CARBON	10K 5% 1/4W
R122	1-215-449-00	METAL	15K 1% 1/6W	R201	1-249-429-11	CARBON	10K 5% 1/4W
R123	1-215-449-00	METAL	15K 1% 1/6W	R202	1-249-425-11	CARBON	4.7K 5% 1/4W
R127	1-249-405-11	CARBON	100 5% 1/4W	R203	1-249-435-11	CARBON	33K 5% 1/4W
R130	1-249-420-11	CARBON	1.8K 5% 1/4W	R204	1-249-441-11	CARBON	100K 5% 1/4W
R131	1-249-425-11	CARBON	4.7K 5% 1/4W	R205	1-249-417-11	CARBON	1K 5% 1/4W
R132	1-249-425-11	CARBON	4.7K 5% 1/4W	R206	1-249-417-11	CARBON	1K 5% 1/4W
R133	1-249-417-11	CARBON	1K 5% 1/4W	R207	1-249-437-11	CARBON	47K 5% 1/4W
R134	1-249-437-11	CARBON	47K 5% 1/4W	R208	1-249-421-11	CARBON	2.2K 5% 1/4W
R135	1-249-425-11	CARBON	4.7K 5% 1/4W	R209	1-247-895-00	CARBON	470K 5% 1/4W
R136	1-249-417-11	CARBON	1K 5% 1/4W	R210	1-249-417-11	CARBON	1K 5% 1/4W
R137	1-215-421-00	METAL	1K 1% 1/6W	R211	1-249-429-11	CARBON	10K 5% 1/4W
R138	1-215-452-00	METAL	20K 1% 1/6W	R212	1-249-417-11	CARBON	1K 5% 1/4W
R139	1-249-417-11	CARBON	1K 5% 1/4W	R213	1-249-429-11	CARBON	10K 5% 1/4W
R141	1-247-895-00	CARBON	470K 5% 1/4W	R214	1-249-421-11	CARBON	2.2K 5% 1/4W
R142	1-249-421-11	CARBON	2.2K 5% 1/4W	R215	1-249-433-11	CARBON	22K 5% 1/4W
R143	1-249-435-11	CARBON	33K 5% 1/4W	R216	1-249-417-11	CARBON	1K 5% 1/4W

D

7. ELECTRICAL PARTS LIST

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R217	1-249-417-11	CARBON	1K 5% 1/4W	R286	1-215-469-00	METAL	100K 1% 1/6W
R218	1-249-441-11	CARBON	100K 5% 1/4W	R287	1-249-429-11	CARBON	10K 5% 1/4W
R219	1-247-895-00	CARBON	470K 5% 1/4W	R288	1-249-417-11	CARBON	1K 5% 1/4W
R220	1-249-429-11	CARBON	10K 5% 1/4W	R289	1-249-405-11	CARBON	100 5% 1/4W
R221	1-249-429-11	CARBON	10K 5% 1/4W	R290	1-249-433-11	CARBON	22K 5% 1/4W
R222	1-249-433-11	CARBON	22K 5% 1/4W	R291	1-249-435-11	CARBON	33K 5% 1/4W
R223	1-249-437-11	CARBON	47K 5% 1/4W	R292	1-249-425-11	CARBON	4.7K 5% 1/4W
R224	1-249-425-11	CARBON	4.7K 5% 1/4W	R293	1-249-413-11	CARBON	470 5% 1/4W
R225	1-249-429-11	CARBON	10K 5% 1/4W	R294	1-249-425-11	CARBON	4.7K 5% 1/4W
R226	1-215-453-00	METAL	22K 1% 1/6W	R295	1-249-421-11	CARBON	2.2K 5% 1/4W
R227	1-215-453-00	METAL	22K 1% 1/6W	R296	1-249-433-11	CARBON	22K 5% 1/4W
R228	1-215-477-00	METAL	220K 1% 1/6W	R297	1-247-895-00	CARBON	470K 5% 1/4W
R229	1-249-429-11	CARBON	10K 5% 1/4W	R298	1-249-417-11	CARBON	1K 5% 1/4W
R230	1-249-441-11	CARBON	100K 5% 1/4W	R299	1-247-895-00	CARBON	470K 5% 1/4W
R231	1-249-433-11	CARBON	22K 5% 1/4W	R300	1-215-437-00	METAL	4.7K 1% 1/6W
R232	1-249-433-11	CARBON	22K 5% 1/4W	R301	1-215-437-00	METAL	4.7K 1% 1/6W
R233	1-249-429-11	CARBON	10K 5% 1/4W	R302	1-249-421-11	CARBON	2.2K 5% 1/4W
R234	1-215-445-00	METAL	10K 1% 1/6W	R303	1-249-423-11	CARBON	3.3K 5% 1/4W
R235	1-215-445-00	METAL	10K 1% 1/6W	R309	1-215-453-00	METAL	22K 1% 1/6W
R236	1-215-469-00	METAL	100K 1% 1/6W	R310	1-215-453-00	METAL	22K 1% 1/6W
R237	1-249-441-11	CARBON	100K 5% 1/4W	R311	1-215-461-00	METAL	47K 1% 1/6W
R238	1-249-429-11	CARBON	10K 5% 1/4W	R312	1-215-453-00	METAL	22K 1% 1/6W
R239	1-249-433-11	CARBON	22K 5% 1/4W	R313	1-215-453-00	METAL	22K 1% 1/6W
R240	1-249-433-11	CARBON	22K 5% 1/4W	R314	1-215-453-00	METAL	22K 1% 1/6W
R241	1-215-451-00	METAL	18K 1% 1/6W	R315	1-215-453-00	METAL	22K 1% 1/6W
R242	1-247-903-00	CARBON	1M 5% 1/4W	R316	1-215-453-00	METAL	22K 1% 1/6W
R243	1-215-451-00	METAL	18K 1% 1/6W	R317	1-215-453-00	METAL	22K 1% 1/6W
R244	1-249-429-11	CARBON	10K 5% 1/4W	R318	1-215-453-00	METAL	22K 1% 1/6W
R245	1-215-451-00	METAL	18K 1% 1/6W	R319	1-215-453-00	METAL	22K 1% 1/6W
R246	1-247-903-00	CARBON	1M 5% 1/4W	R320	1-215-461-00	METAL	47K 1% 1/6W
R247	1-215-451-00	METAL	18K 1% 1/6W	R321	1-215-453-00	METAL	22K 1% 1/6W
R248	1-249-429-11	CARBON	10K 5% 1/4W	R322	1-215-453-00	METAL	22K 1% 1/6W
R249	1-249-433-11	CARBON	22K 5% 1/4W	R323	1-215-457-00	METAL	33K 1% 1/6W
R250	1-249-441-11	CARBON	100K 5% 1/4W	R324	1-215-461-00	METAL	47K 1% 1/6W
R251	1-249-405-11	CARBON	100 5% 1/4W	R325	1-215-461-00	METAL	47K 1% 1/6W
R252	1-249-405-11	CARBON	100 5% 1/4W	R326	1-215-461-00	METAL	47K 1% 1/6W
R253	1-249-421-11	CARBON	2.2K 5% 1/4W	R327	1-215-457-00	METAL	33K 1% 1/6W
R254	1-215-445-00	METAL	10K 1% 1/6W	R328	1-215-457-00	METAL	33K 1% 1/6W
R255	1-249-429-11	CARBON	10K 5% 1/4W	R329	1-215-477-00	METAL	220K 1% 1/6W
R256	1-215-445-00	METAL	10K 1% 1/6W	R330	1-215-469-00	METAL	100K 1% 1/6W
R257	1-249-429-11	CARBON	10K 5% 1/4W	R331	1-215-477-00	METAL	220K 1% 1/6W
R262	1-215-445-00	METAL	10K 1% 1/6W	R332	1-215-457-00	METAL	33K 1% 1/6W
R263	1-249-429-11	CARBON	10K 5% 1/4W	R333	1-215-421-00	METAL	1K 1% 1/6W
R264	1-215-445-00	METAL	10K 1% 1/6W	R334	1-249-433-11	CARBON	22K 5% 1/4W
R265	1-249-433-11	CARBON	22K 5% 1/4W	R335	1-249-437-11	CARBON	47K 5% 1/4W
R266	1-249-441-11	CARBON	100K 5% 1/4W	R336	1-215-457-00	METAL	33K 1% 1/6W
R267	1-249-405-11	CARBON	100 5% 1/4W	R337	1-215-461-00	METAL	47K 1% 1/6W
R268	1-249-417-11	CARBON	1K 5% 1/4W	R338	1-215-461-00	METAL	47K 1% 1/6W
R269	1-215-445-00	METAL	10K 1% 1/6W	R339	1-215-461-00	METAL	47K 1% 1/6W
R270	1-249-429-11	CARBON	10K 5% 1/4W	R340	1-215-457-00	METAL	33K 1% 1/6W
R271	1-215-445-00	METAL	10K 1% 1/6W	R341	1-215-461-00	METAL	47K 1% 1/6W
R272	1-215-469-00	METAL	100K 1% 1/6W	R344	1-215-445-00	METAL	10K 1% 1/6W
R273	1-249-429-11	CARBON	10K 5% 1/4W	R345	1-215-469-00	METAL	100K 1% 1/6W
R274	1-249-417-11	CARBON	1K 5% 1/4W	R346	1-249-429-11	CARBON	10K 5% 1/4W
R275	1-249-405-11	CARBON	100 5% 1/4W	R347	1-215-445-00	METAL	10K 1% 1/6W
R276	1-249-433-11	CARBON	22K 5% 1/4W	R350	1-215-437-00	METAL	4.7K 1% 1/6W
R277	1-249-435-11	CARBON	33K 5% 1/4W	R351	1-249-429-11	CARBON	10K 5% 1/4W
R278	1-249-425-11	CARBON	4.7K 5% 1/4W	R352	1-249-405-11	CARBON	100 5% 1/4W
R279	1-249-425-11	CARBON	4.7K 5% 1/4W	R353	1-249-433-11	CARBON	22K 5% 1/4W
R280	1-249-413-11	CARBON	470 5% 1/4W	R354	1-249-417-11	CARBON	1K 5% 1/4W
R281	1-249-433-11	CARBON	22K 5% 1/4W	R355	1-249-421-11	CARBON	2.2K 5% 1/4W
R282	1-249-421-11	CARBON	2.2K 5% 1/4W	R356	1-249-393-11	CARBON	10 5% 1/4W
R283	1-249-417-11	CARBON	1K 5% 1/4W	R357	1-249-393-11	CARBON	10 5% 1/4W
R284	1-247-895-00	CARBON	470K 5% 1/4W	R358	1-249-435-11	CARBON	33K 5% 1/4W
R285	1-247-895-00	CARBON	470K 5% 1/4W	R359	1-249-429-11	CARBON	10K 5% 1/4W



Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R360	1-215-397-00	METAL	100 1% 1/6W	R516	1-249-421-11	CARBON	2.2K 5% 1/4W
R361	1-249-421-11	CARBON	2.2K 5% 1/4W	R517	1-249-421-11	CARBON	2.2K 5% 1/4W
R362	1-249-425-11	CARBON	4.7K 5% 1/4W	R518	1-249-433-11	CARBON	22K 5% 1/4W
R363	1-249-425-11	CARBON	4.7K 5% 1/4W	R519	1-249-433-11	CARBON	22K 5% 1/4W
R364	1-249-413-11	CARBON	470 5% 1/4W	R520	1-249-429-11	CARBON	10K 5% 1/4W
R366	1-249-421-11	CARBON	2.2K 5% 1/4W	R521	1-215-421-00	METAL	1K 1% 1/6W
R367	1-249-433-11	CARBON	22K 5% 1/4W	R522	1-215-421-00	METAL	1K 1% 1/6W
R369	1-215-479-00	METAL	270K 1% 1/6W	R525	1-215-449-00	METAL	15K 1% 1/6W
R370	1-249-417-11	CARBON	1K 5% 1/4W	R529	1-215-443-00	METAL	8.2K 1% 1/6W
R371	1-247-895-00	CARBON	470K 5% 1/4W	R533	1-215-421-00	METAL	1K 1% 1/6W
R372	1-215-469-00	METAL	100K 1% 1/6W	R534	1-215-413-00	METAL	470 1% 1/6W
R373	1-202-735-00	SOLID	22M 10% 1/2W	R535	1-249-429-11	CARBON	10K 5% 1/4W
R374	1-215-477-00	METAL	220K 1% 1/6W	R536	1-249-429-11	CARBON	10K 5% 1/4W
R375	1-247-895-00	CARBON	470K 5% 1/4W	R537	1-249-429-11	CARBON	10K 5% 1/4W
R376	1-249-435-11	CARBON	33K 5% 1/4W	R538	1-249-427-11	CARBON	6.8K 5% 1/4W
R377	1-215-437-00	METAL	4.7K 1% 1/6W	R539	1-249-427-11	CARBON	6.8K 5% 1/4W
R378	1-215-469-00	METAL	100K 1% 1/6W	R540	1-249-405-11	CARBON	100 5% 1/4W
R379	1-249-429-11	CARBON	10K 5% 1/4W	R541	1-249-429-11	CARBON	10K 5% 1/4W
R380	1-215-437-00	METAL	4.7K 1% 1/6W	R542	1-215-437-00	METAL	4.7K 1% 1/6W
R381	1-215-461-00	METAL	47K 1% 1/6W	R543	1-215-437-00	METAL	4.7K 1% 1/6W
R382	1-249-405-11	CARBON	100 5% 1/4W	R544	1-249-425-11	CARBON	4.7K 5% 1/4W
R383	1-249-433-11	CARBON	22K 5% 1/4W	R545	1-249-429-11	CARBON	10K 5% 1/4W
R384	1-249-425-11	CARBON	4.7K 5% 1/4W	R546	1-249-417-11	CARBON	1K 5% 1/4W
R385	1-249-417-11	CARBON	1K 5% 1/4W	R548	1-249-417-11	CARBON	1K 5% 1/4W
R386	1-249-433-11	CARBON	22K 5% 1/4W	R549	1-249-417-11	CARBON	1K 5% 1/4W
R387	1-215-421-00	METAL	1K 1% 1/6W	R550	1-247-895-00	CARBON	470K 5% 1/4W
R389	1-249-405-11	CARBON	100 5% 1/4W	R551	1-215-405-00	METAL	220 1% 1/6W
R390	1-249-435-11	CARBON	33K 5% 1/4W	R552	1-215-421-00	METAL	1K 1% 1/6W
R391	1-249-425-11	CARBON	4.7K 5% 1/4W	R554	1-249-425-11	CARBON	4.7K 5% 1/4W
R392	1-249-425-11	CARBON	4.7K 5% 1/4W	R555	1-215-429-00	METAL	2.2K 1% 1/6W
R393	1-249-413-11	CARBON	470 5% 1/4W	R556	1-249-429-11	CARBON	10K 5% 1/4W
R394	1-249-405-11	CARBON	100 5% 1/4W	R561	1-249-433-11	CARBON	22K 5% 1/4W
R395	1-249-421-11	CARBON	2.2K 5% 1/4W	R562	1-249-429-11	CARBON	10K 5% 1/4W
R396	1-249-433-11	CARBON	22K 5% 1/4W	R563	1-249-420-11	CARBON	1.8K 5% 1/4W
R397	1-249-417-11	CARBON	1K 5% 1/4W	R564	1-249-433-11	CARBON	22K 5% 1/4W
R398	1-247-895-00	CARBON	470K 5% 1/4W	R565	1-249-429-11	CARBON	10K 5% 1/4W
R399	1-249-421-11	CARBON	2.2K 5% 1/4W	R566	1-249-437-11	CARBON	47K 5% 1/4W
R400	1-247-895-00	CARBON	470K 5% 1/4W	R567	1-215-451-00	METAL	18K 1% 1/6W
R406	1-215-431-00	METAL	2.7K 1% 1/6W	R568	1-215-453-00	METAL	22K 1% 1/6W
R407	1-215-453-00	METAL	22K 1% 1/6W	R569	1-247-895-00	CARBON	470K 5% 1/4W
R410	1-247-903-00	CARBON	1M 5% 1/4W	R570	1-249-421-11	CARBON	2.2K 5% 1/4W
R411	1-247-903-00	CARBON	1M 5% 1/4W	R571	1-249-425-11	CARBON	4.7K 5% 1/4W
R412	1-215-421-00	METAL	1K 1% 1/6W	R572	1-249-431-11	CARBON	15K 5% 1/4W
R414	1-215-445-00	METAL	10K 1% 1/6W	R573	1-249-441-11	CARBON	100K 5% 1/4W
R415	1-249-405-11	CARBON	100 5% 1/4W	R574	1-249-417-11	CARBON	1K 5% 1/4W
R450	1-249-429-11	CARBON	10K 5% 1/4W	R575	1-249-425-11	CARBON	4.7K 5% 1/4W
R452	1-249-423-11	CARBON	3.3K 5% 1/4W	R576	1-215-453-00	METAL	22K 1% 1/6W
R453	1-215-389-00	METAL	47 1% 1/6W	R577	1-215-445-00	METAL	10K 1% 1/6W
R454	1-249-393-11	CARBON	10 5% 1/4W	R578	1-249-429-11	CARBON	10K 5% 1/4W
R455	1-249-413-11	CARBON	470 5% 1/4W	R579	1-249-393-11	CARBON	10 5% 1/4W F
R456	1-249-405-11	CARBON	100 5% 1/4W	R580	1-249-393-11	CARBON	10 5% 1/4W F
R457	1-249-405-11	CARBON	100 5% 1/4W	R581	1-249-389-11	CARBON	4.7 5% 1/4W F
R458	1-249-427-11	CARBON	6.8K 5% 1/4W	R582	1-249-425-11	CARBON	4.7K 5% 1/4W
R501	1-249-417-11	CARBON	1K 5% 1/4W	R583	1-249-429-11	CARBON	10K 5% 1/4W
R505	1-215-421-00	METAL	1K 1% 1/6W	R584	1-249-429-11	CARBON	10K 5% 1/4W
R506	1-249-430-11	CARBON	12K 5% 1/4W	R585	1-215-431-00	METAL	2.7K 1% 1/6W
R507	1-249-417-11	CARBON	1K 5% 1/4W	VARIABLE RESISTOR			
R508	1-249-429-11	CARBON	10K 5% 1/4W	RV1	1-237-517-21	RES, ADJ, CERMET 5K	
R509	1-249-417-11	CARBON	1K 5% 1/4W	RV2	1-237-517-21	RES, ADJ, CERMET 5K	
R510	1-249-417-11	CARBON	1K 5% 1/4W	RV3	1-237-518-21	RES, ADJ, CERMET 10K	
R511	1-249-429-11	CARBON	10K 5% 1/4W	RV4	1-237-517-21	RES, ADJ, CERMET 5K	
R512	1-249-429-11	CARBON	10K 5% 1/4W	RV5	1-237-517-21	RES, ADJ, CERMET 5K	
R513	1-249-429-11	CARBON	10K 5% 1/4W	RV6	1-237-517-21	RES, ADJ, CERMET 5K	
R514	1-249-433-11	CARBON	22K 5% 1/4W	RV7	1-237-519-21	RES, ADJ, CERMET 20K	
R515	1-249-421-11	CARBON	2.2K 5% 1/4W	RV8	1-237-519-21	RES, ADJ, CERMET 20K	
				RV9	1-237-517-21	RES, ADJ, CERMET 5K	
				RV10	1-237-518-21	RES, ADJ, CERMET 10K	



Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
RV12	1-237-519-21	RES, ADJ, CERMET 20K					
RV14	1-237-518-21	RES, ADJ, CERMET 10K					
RV15	1-237-519-21	RES, ADJ, CERMET 20K					
RV16	1-237-519-21	RES, ADJ, CERMET 20K					
RV17	1-237-519-21	RES, ADJ, CERMET 20K					
RV18	1-237-519-21	RES, ADJ, CERMET 20K					
RV19	1-237-519-21	RES, ADJ, CERMET 20K					
RV22	1-237-518-21	RES, ADJ, CERMET 10K					
RV23	1-237-518-21	RES, ADJ, CERMET 10K					
RV24	1-237-518-21	RES, ADJ, CERMET 10K					
RV25	1-237-518-21	RES, ADJ, CERMET 10K					
RV26	1-237-518-21	RES, ADJ, CERMET 10K					
RV27	1-237-518-21	RES, ADJ, CERMET 10K					
RV28	1-237-518-21	RES, ADJ, CERMET 10K					
RV29	1-237-518-21	RES, ADJ, CERMET 10K					
RV30	1-237-518-21	RES, ADJ, CERMET 10K					
RV31	1-237-518-21	RES, ADJ, CERMET 10K					
RV32	1-237-518-21	RES, ADJ, CERMET 10K					
RV33	1-237-518-21	RES, ADJ, CERMET 10K					
RV34	1-237-518-21	RES, ADJ, CERMET 10K					
RV35	1-237-518-21	RES, ADJ, CERMET 10K					
RV36	1-237-518-21	RES, ADJ, CERMET 10K					
RV37	1-237-518-21	RES, ADJ, CERMET 10K					
RV38	1-237-518-21	RES, ADJ, CERMET 10K					
RV39	1-237-518-21	RES, ADJ, CERMET 10K					
RV40	1-237-518-21	RES, ADJ, CERMET 10K					
RV41	1-237-518-21	RES, ADJ, CERMET 10K					
RV42	1-237-518-21	RES, ADJ, CERMET 10K					
RV43	1-237-518-21	RES, ADJ, CERMET 10K					
RV44	1-237-518-21	RES, ADJ, CERMET 10K					
RV45	1-237-518-21	RES, ADJ, CERMET 10K					
RV46	1-237-518-21	RES, ADJ, CERMET 10K					
RV47	1-237-518-21	RES, ADJ, CERMET 10K					
RV48	1-237-518-21	RES, ADJ, CERMET 10K					
RV49	1-237-518-21	RES, ADJ, CERMET 10K					
RV50	1-237-518-21	RES, ADJ, CERMET 10K					
RV51	1-237-518-21	RES, ADJ, CERMET 10K					
RV54	1-237-520-21	RES, ADJ, CERMET 50K					
RV55	1-237-520-21	RES, ADJ, CERMET 50K					
RV56	1-237-518-21	RES, ADJ, CERMET 10K					
RV58	1-237-519-21	RES, ADJ, CERMET 20K					
RV60	1-237-519-21	RES, ADJ, CERMET 20K					
RV61	1-237-519-21	RES, ADJ, CERMET 20K					
RV62	1-237-518-21	RES, ADJ, CERMET 10K					
RV63	1-237-518-21	RES, ADJ, CERMET 10K					
RV66	1-237-519-21	RES, ADJ, CERMET 20K					
RV70	1-224-250-XX	RES, ADJ, METAL GLAZE 2.2K					
RV71	1-237-518-21	RES, ADJ, CERMET 10K					
RV72	1-237-517-21	RES, ADJ, CERMET 5K					
RV73	1-237-517-21	RES, ADJ, CERMET 5K					
RV74	1-237-517-21	RES, ADJ, CERMET 5K					
RV75	1-237-516-21	RES, ADJ, CERMET 2K					
RV76	1-237-512-21	RES, ADJ, CERMET 100					
RV77	1-237-517-21	RES, ADJ, CERMET 5K					
RV78	1-237-518-21	RES, ADJ, CERMET 10K					
*****				*****			
*1-619-842-11 W BOARD				*****			
*****				*****			
CAPACITOR				*****			
C1	1-124-589-11	ELECT	47MF	20%	16V		
C2	1-124-589-11	ELECT	47MF	20%	16V		
C3	1-136-165-00	FILM	0.1MF	5%	50V		
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			
*****				*****			



Ref.No. Part No. Description

DIODE

D101 8-719-812-42 DIODE TLY124
D102 8-719-812-42 DIODE TLY124
D103 8-719-812-42 DIODE TLY124
D104 8-719-812-42 DIODE TLY124
D105 8-719-911-19 DIODE 1SS119

D106 8-719-911-19 DIODE 1SS119
D108 8-719-911-19 DIODE 1SS119
D109 8-719-911-19 DIODE 1SS119

IC

IC1 8-759-240-53 IC TC4053BP
IC2 8-759-240-53 IC TC4053BP
IC3 8-759-645-19 IC M54519P

CONNECTOR

JA1 *1-566-058-11 PIN, CONNECTOR 6P
JA2 *1-566-056-11 PIN, CONNECTOR 4P
JA3 *1-566-056-11 PIN, CONNECTOR 4P
S111 *1-561-724-00 SOCKET, CONNECTOR 2P
S111 *1-564-431-11 POST, CONNECTOR 3P

S112 *1-561-724-00 SOCKET, CONNECTOR 2P
S112 *1-564-431-11 POST, CONNECTOR 3P
S113 1-570-510-11 SWITCH, TOGGLE

TRANSISTOR

Q101 8-729-178-54 TRANSISTOR 2SC2785
Q102 8-729-900-36 TRANSISTOR DTC124ES
Q103 8-729-900-36 TRANSISTOR DTC124ES

RESISTOR

R103 1-249-428-11 CARBON 8.2K 5% 1/4W
R104 1-249-428-11 CARBON 8.2K 5% 1/4W
R105 1-215-425-00 METAL 1.5K 1% 1/6W
R106 1-215-445-00 METAL 10K 1% 1/6W
R108 1-249-405-11 CARBON 100 5% 1/4W

R109 1-249-405-11 CARBON 100 5% 1/4W
R110 1-249-405-11 CARBON 100 5% 1/4W
R111 1-249-405-11 CARBON 100 5% 1/4W
R112 1-249-429-11 CARBON 10K 5% 1/4W
R113 1-249-405-11 CARBON 100 5% 1/4W

R114 1-249-405-11 CARBON 100 5% 1/4W
R115 1-249-405-11 CARBON 100 5% 1/4W
R116 1-249-429-11 CARBON 10K 5% 1/4W
R117 1-249-405-11 CARBON 100 5% 1/4W
R118 1-249-429-11 CARBON 10K 5% 1/4W

R119 1-249-405-11 CARBON 100 5% 1/4W
R120 1-249-405-11 CARBON 100 5% 1/4W
R121 1-249-428-11 CARBON 8.2K 5% 1/4W
R122 1-249-428-11 CARBON 8.2K 5% 1/4W
R123 1-249-405-11 CARBON 100 5% 1/4W

R124 1-249-417-11 CARBON 1K 5% 1/4W
R125 1-249-429-11 CARBON 10K 5% 1/4W
R126 1-249-429-11 CARBON 10K 5% 1/4W
R127 1-249-405-11 CARBON 100 5% 1/4W
R128 1-249-405-11 CARBON 100 5% 1/4W

R129 1-249-405-11 CARBON 100 5% 1/4W
R130 1-249-429-11 CARBON 10K 5% 1/4W

Ref.No. Part No. Description

VARIABLE RESISTOR

RV101 1-237-519-21 RES, ADJ, CERMET 20K
RV102 1-237-121-11 RES, VAR (CP ELEMENT) 20K
RV103 1-237-519-21 RES, ADJ, CERMET 20K
RV104 1-237-121-11 RES, VAR (CP ELEMENT) 20K

SWITCH

S101 1-570-509-11 SWITCH, TOGGLE
S102 1-570-509-11 SWITCH, TOGGLE
S103 1-554-472-00 SWITCH, PUSH (1 KEY)
S104 1-554-472-00 SWITCH, PUSH (1 KEY)
S105 1-554-472-00 SWITCH, PUSH (1 KEY)

S106 1-554-472-00 SWITCH, PUSH (1 KEY)
S107 1-554-472-00 SWITCH, PUSH (1 KEY)
S108 1-570-509-11 SWITCH, TOGGLE
S109 1-570-509-11 SWITCH, TOGGLE
S110 1-570-510-11 SWITCH, TOGGLE

*1-627-688-11 JB BOARD

CONNECTOR

JB1 *1-566-054-11 PIN, CONNECTOR 2P
JB4 *1-566-057-11 PIN, CONNECTOR 5P

SWITCH

S1 1-570-372-11 SWITCH, PUSH (1 KEY)
S3 1-554-472-00 SWITCH, PUSH (1 KEY)
S4 1-554-472-00 SWITCH, PUSH (1 KEY)

*1-626-505-11 U BOARD

CAPACITOR

C1 1-102-973-00 CERAMIC 100PF 5% 50V
C2 1-102-973-00 CERAMIC 100PF 5% 50V
C3 1-136-153-00 FILM 0.01MF 5% 50V
C4 1-123-369-00 ELECT 4.7MF 20% 25V
C5 1-123-333-00 ELECT 100MF 20% 16V
C6 1-123-333-00 ELECT 100MF 20% 16V

DIODE

D1 8-719-911-19 DIODE 1SS119
D2 8-719-911-19 DIODE 1SS119

IC

IC1 8-759-103-92 IC UPC318C

COIL

L1 1-408-239-00 INDUCTOR 4.7MMH

U Y XA K ZN

Les composants identifiés par une trame et une marque **Δ** sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

The components identified by shading and mark **Δ** are critical for safety. Replace only with part number specified.

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
TRANSISTOR				*1-610-380-12 K BOARD *****			
Q1	8-729-178-55	TRANSISTOR 2SC2785-E		CAPACITOR			
Q2	8-729-178-55	TRANSISTOR 2SC2785-E		C1	Δ 1-162-169-12	CAP BLOCK, HIGH-VOLTAGE	0 0
Q3	8-729-178-55	TRANSISTOR 2SC2785-E		C2	1-136-106-00	FILM 0.36MF	5% 200V
Q4	8-729-178-55	TRANSISTOR 2SC2785-E		CONNECTOR			
Q5	8-729-378-91	TRANSISTOR 2SD789		K1	*1-508-768-00	PIN, CONNECTOR (5MM PITCH)	6P
RESISTOR				K2	*1-508-766-00	PIN, CONNECTOR (5MM PITCH)	4P
R1	1-249-429-11	CARBON 10K 5% 1/4W		K3	*1-566-055-11	PIN, CONNECTOR	3P
R2	1-249-433-11	CARBON 22K 5% 1/4W		K4	*1-566-059-11	PIN, CONNECTOR	7P
R3	1-249-417-11	CARBON 1K 5% 1/4W		K5	*1-566-058-11	PIN, CONNECTOR	6P
R4	1-249-429-11	CARBON 10K 5% 1/4W		K6	*1-508-765-00	PIN, CONNECTOR (5MM PITCH)	3P
R5	1-249-433-11	CARBON 22K 5% 1/4W		K8	*1-508-784-00	PIN, CONNECTOR (5MM PITCH)	1P
R6	1-249-417-11	CARBON 1K 5% 1/4W		RESISTOR			
R7	1-249-425-11	CARBON 4.7K 5% 1/4W		R1	1-202-818-00	SOLID 1K 10% 1/2W	
R8	1-249-437-11	CARBON 47K 5% 1/4W		*****			
R9	1-249-437-11	CARBON 47K 5% 1/4W		*1-626-502-11 ZN BOARD *****			
R10	1-249-405-11	CARBON 100 5% 1/4W		CONNECTOR			
R11	1-249-425-11	CARBON 4.7K 5% 1/4W		ZN1	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R12	1-215-445-00	METAL 10K 1% 1/6W			4-378-915-01	NUT (M2.6), PLATE; ZN1	
R13	1-249-417-11	CARBON 1K 5% 1/4W		ZN2	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R14	1-215-485-00	METAL 470K 1% 1/6W			4-378-915-01	NUT (M2.6), PLATE; ZN2	
R15	1-215-429-00	METAL 2.2K 1% 1/6W		ZN3	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R16	1-215-445-00	METAL 10K 1% 1/6W			4-378-915-01	NUT (M2.6), PLATE; ZN3	
R17	1-249-421-11	CARBON 2.2K 5% 1/4W		ZN4	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R18	1-249-405-11	CARBON 100 5% 1/4W			4-378-915-01	NUT (M2.6), PLATE; ZN4	
R19	1-249-437-11	CARBON 47K 5% 1/4W		ZN5	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R20	1-249-381-11	CARBON 1 5% 1/4W F			4-378-915-01	NUT (M2.6), PLATE; ZN5	
R21	1-215-867-00	METAL OXIDE 470 5% 1W F		ZN6	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
R22	1-215-857-11	METAL OXIDE 10 5% 1W F			4-378-915-01	NUT (M2.6), PLATE; ZN6	
VARIABLE RESISTOR				ZN7	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
RV1	1-237-518-21	RES, ADJ, CERMET 10K			4-378-915-01	NUT (M2.6), PLATE; ZN7	
RV2	1-237-519-21	RES, ADJ, CERMET 20K		ZN8	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
CONNECTOR					4-378-915-01	NUT (M2.6), PLATE; ZN8	
U1	*1-566-055-11	PIN, CONNECTOR 3P		ZN9	*1-566-060-11	PIN, CONNECTOR	8P
U2	*1-566-054-11	PIN, CONNECTOR 2P		ZN10	*1-566-060-11	PIN, CONNECTOR	8P
U3	*1-566-054-11	PIN, CONNECTOR 2P		ZN11	*1-566-060-11	PIN, CONNECTOR	8P
*****				ZN12	*1-566-058-11	PIN, CONNECTOR	6P
*1-627-689-11 Y BOARD *****				ZN14	*1-566-062-11	PIN, CONNECTOR	10P
*4-360-299-01 HOLDER, LED				ZN15	*1-566-057-11	PIN, CONNECTOR	5P
DIODE				ZN16	*1-566-057-11	PIN, CONNECTOR	5P
D1	8-719-812-43	DIODE TLG124A		ZN17	*1-566-057-11	PIN, CONNECTOR	5P
*****				ZN19	*1-566-054-11	PIN, CONNECTOR	2P
*A-1389-709-A XA BOARD, COMPLETE *****				ZN21	*1-566-059-11	PIN, CONNECTOR	7P
*1-563-164-11 CONNECTOR, MULTI (L-J) 64P				ZN22	*1-566-058-11	PIN, CONNECTOR	6P
4-378-915-01 NUT (M2.6), PLATE				ZN23	*1-566-058-11	PIN, CONNECTOR	6P
CONNECTOR				ZN25	*1-566-058-11	PIN, CONNECTOR	6P
XA1	*1-562-729-11	CONNECTOR, MULTI 64P		ZN26	*1-566-058-11	PIN, CONNECTOR	6P
				ZN27	*1-566-058-11	PIN, CONNECTOR	6P
				ZN30	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR	64P
					4-378-915-01	NUT (M2.6), PLATE; ZN30	

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
*A-1394-098-A		ZE BOARD, COMPLETE *****		C301	1-101-888-00	CERAMIC 68PF	10% 50V
				C302	1-102-934-00	CERAMIC 1PF	0.5PF 50V
3-618-225-00		NUT, PLATE		C303	1-101-888-00	CERAMIC 68PF	10% 50V
*4-353-708-00		HOOK, FINGER		C304	1-102-934-00	CERAMIC 1PF	0.5PF 50V
4-378-915-01		NUT (M2.6), PLATE (N1,N2)		C305	1-102-978-00	CERAMIC 220PF	10% 50V
CAPACITOR				C306	1-102-978-00	CERAMIC 220PF	10% 50V
C1	1-101-361-00	CERAMIC 150PF	10% 50V	C307	1-102-963-00	CERAMIC 33PF	10% 50V
C2	1-101-361-00	CERAMIC 150PF	10% 50V	C308	1-101-004-00	CERAMIC 0.01MF	50V
C3	1-124-120-11	ELECT 220MF	20% 16V	C309	1-101-004-00	CERAMIC 0.01MF	50V
C4	1-101-004-00	CERAMIC 0.01MF	50V	C310	1-101-004-00	CERAMIC 0.01MF	50V
C5	1-101-004-00	CERAMIC 0.01MF	50V	C311	1-101-004-00	CERAMIC 0.01MF	50V
C6	1-101-004-00	CERAMIC 0.01MF	50V	C312	1-101-004-00	CERAMIC 0.01MF	50V
C7	1-101-004-00	CERAMIC 0.01MF	50V	C313	1-101-004-00	CERAMIC 0.01MF	50V
C8	1-101-004-00	CERAMIC 0.01MF	50V	C314	1-101-004-00	CERAMIC 0.01MF	50V
C9	1-101-004-00	CERAMIC 0.01MF	50V	C315	1-101-004-00	CERAMIC 0.01MF	50V
C10	1-101-004-00	CERAMIC 0.01MF	50V	C316	1-101-004-00	CERAMIC 0.01MF	50V
C11	1-124-120-11	ELECT 220MF	20% 16V	C317	1-101-004-00	CERAMIC 0.01MF	50V
C12	1-124-120-11	ELECT 220MF	20% 16V	CONNECTOR			
C13	1-126-101-11	ELECT 100MF	20% 16V	CON1	*1-562-729-11	CONNECTOR, MULTI 64P	
C14	1-126-101-11	ELECT 100MF	20% 16V	DIODE			
C15	1-101-004-00	CERAMIC 0.01MF	50V	D1	8-719-911-19	DIODE 1SS119	
C16	1-101-004-00	CERAMIC 0.01MF	50V	D2	8-719-911-19	DIODE 1SS119	
C17	1-124-477-11	ELECT 47MF	20% 16V	D3	8-719-911-19	DIODE 1SS119	
C18	1-124-477-11	ELECT 47MF	20% 16V	D4	8-719-911-19	DIODE 1SS119	
C19	1-101-888-00	CERAMIC 68PF	10% 50V	D5	8-719-911-19	DIODE 1SS119	
C20	1-101-004-00	CERAMIC 0.01MF	50V	IC			
C21	1-101-004-00	CERAMIC 0.01MF	50V	IC1	8-759-202-11	IC TC74HC00P	
C22	1-101-004-00	CERAMIC 0.01MF	50V	IC2	8-759-202-30	IC TC74HC161P	
C101	1-101-888-00	CERAMIC 68PF	10% 50V	IC3	8-759-202-30	IC TC74HC161P	
C102	1-102-934-00	CERAMIC 1PF	0.5PF 50V	IC4	8-759-202-30	IC TC74HC161P	
C103	1-101-888-00	CERAMIC 68PF	10% 50V	IC5	8-759-202-30	IC TC74HC161P	
C104	1-102-934-00	CERAMIC 1PF	0.5PF 50V	IC6	8-759-902-83	IC SN74LS283N	
C105	1-102-978-00	CERAMIC 220PF	10% 50V	IC7	8-759-902-83	IC SN74LS283N	
C106	1-102-978-00	CERAMIC 220PF	10% 50V	IC8	8-759-908-00	IC DAC08HQ	
C107	1-102-963-00	CERAMIC 33PF	10% 50V	IC9	8-759-910-83	IC TL072ACP	
C108	1-101-004-00	CERAMIC 0.01MF	50V	IC10	8-759-171-08	IC UPC7808H	
C109	1-101-004-00	CERAMIC 0.01MF	50V	IC11	8-759-179-08	IC UPC7908H	
C110	1-101-004-00	CERAMIC 0.01MF	50V	IC12	8-759-007-10	IC MC74HC541N	
C111	1-101-004-00	CERAMIC 0.01MF	50V	IC13	8-759-400-29	IC AN78L04	
C112	1-101-004-00	CERAMIC 0.01MF	50V	*1-526-659-00 SOCKET, IC (DP) 28P; IC101			
C113	1-101-004-00	CERAMIC 0.01MF	50V	IC102	8-759-203-50	IC TC74HC574P	
C114	1-101-004-00	CERAMIC 0.01MF	50V	IC103	8-759-203-50	IC TC74HC574P	
C115	1-101-004-00	CERAMIC 0.01MF	50V	IC104	8-759-203-50	IC TC74HC574P	
C116	1-101-004-00	CERAMIC 0.01MF	50V	IC105	8-759-908-00	IC DAC08HQ	
C117	1-101-004-00	CERAMIC 0.01MF	50V	IC106	8-759-908-00	IC DAC08HQ	
C201	1-101-888-00	CERAMIC 68PF	10% 50V	IC107	8-759-903-16	IC LM318P	
C202	1-102-934-00	CERAMIC 1PF	0.5PF 50V	*1-526-659-00 SOCKET, IC (DP) 28P; IC201			
C203	1-101-888-00	CERAMIC 68PF	10% 50V	IC202	8-759-203-50	IC TC74HC574P	
C204	1-102-934-00	CERAMIC 1PF	0.5PF 50V	IC203	8-759-203-50	IC TC74HC574P	
C205	1-102-978-00	CERAMIC 220PF	10% 50V	IC204	8-759-203-50	IC TC74HC574P	
C206	1-102-978-00	CERAMIC 220PF	10% 50V	IC205	8-759-908-00	IC DAC08HQ	
C207	1-102-963-00	CERAMIC 33PF	10% 50V	IC206	8-759-908-00	IC DAC08HQ	
C208	1-101-004-00	CERAMIC 0.01MF	50V	IC207	8-759-903-16	IC LM318P	
C209	1-101-004-00	CERAMIC 0.01MF	50V	*1-526-659-00 SOCKET, IC (DP) 28P; IC301			
C210	1-101-004-00	CERAMIC 0.01MF	50V	IC302	8-759-203-50	IC TC74HC574P	
C211	1-101-004-00	CERAMIC 0.01MF	50V	IC303	8-759-203-50	IC TC74HC574P	
C212	1-101-004-00	CERAMIC 0.01MF	50V	IC304	8-759-203-50	IC TC74HC574P	
C213	1-101-004-00	CERAMIC 0.01MF	50V	IC305	8-759-908-00	IC DAC08HQ	
C214	1-101-004-00	CERAMIC 0.01MF	50V	IC306	8-759-908-00	IC DAC08HQ	
C215	1-101-004-00	CERAMIC 0.01MF	50V				
C216	1-101-004-00	CERAMIC 0.01MF	50V				
C217	1-101-004-00	CERAMIC 0.01MF	50V				

ZE ZA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
IC307	8-759-903-16	IC LM318P		CAPACITOR			
RESISTOR				C1	1-123-661-00	ELECT 100MF	20% 6.3V
R1	1-215-421-00	METAL 1K 1% 1/6W		C2	1-123-661-00	ELECT 100MF	20% 6.3V
R2	1-215-421-00	METAL 1K 1% 1/6W		C3	1-124-589-11	ELECT 47MF	20% 16V
R3	1-215-397-00	METAL 100 1% 1/6W		C4	1-124-589-11	ELECT 47MF	20% 16V
R4	1-215-409-00	METAL 330 1% 1/6W		C5	1-124-589-11	ELECT 47MF	20% 16V
R6	1-215-427-00	METAL 1.8K 1% 1/6W		C6	1-124-589-11	ELECT 47MF	20% 16V
R7	1-215-421-00	METAL 1K 1% 1/6W		C7	1-101-004-00	CERAMIC 0.01MF	50V
R8	1-215-421-00	METAL 1K 1% 1/6W		C8	1-101-004-00	CERAMIC 0.01MF	50V
R9	1-215-421-00	METAL 1K 1% 1/6W		C9	1-131-365-00	TANTALUM 10MF	10% 16V
R10	1-215-421-00	METAL 1K 1% 1/6W		C10	1-101-004-00	CERAMIC 0.01MF	50V
R11	1-215-421-00	METAL 1K 1% 1/6W		C11	1-101-004-00	CERAMIC 0.01MF	50V
R12	1-215-421-00	METAL 1K 1% 1/6W		C12	1-131-365-00	TANTALUM 10MF	10% 16V
R13	1-215-421-00	METAL 1K 1% 1/6W		C13	1-102-973-00	CERAMIC 100PF	10% 50V
R14	1-215-445-00	METAL 10K 1% 1/6W		C14	1-102-980-00	CERAMIC 270PF	5% 50V
R15	1-215-437-00	METAL 4.7K 1% 1/6W		C20	1-101-001-00	CERAMIC 0.001MF	50V
R16	1-215-437-00	METAL 4.7K 1% 1/6W		C21	1-101-001-00	CERAMIC 0.001MF	50V
R17	1-215-437-00	METAL 4.7K 1% 1/6W		C22	1-101-001-00	CERAMIC 0.001MF	50V
R101	1-215-421-00	METAL 1K 1% 1/6W		C23	1-101-001-00	CERAMIC 0.001MF	50V
R102	1-215-421-00	METAL 1K 1% 1/6W		C24	1-101-001-00	CERAMIC 0.001MF	50V
R103	1-215-421-00	METAL 1K 1% 1/6W		C25	1-101-001-00	CERAMIC 0.001MF	50V
R104	1-215-421-00	METAL 1K 1% 1/6W		C26	1-101-001-00	CERAMIC 0.001MF	50V
R105	1-215-421-00	METAL 1K 1% 1/6W		C27	1-101-001-00	CERAMIC 0.001MF	50V
R106	1-215-421-00	METAL 1K 1% 1/6W		C28	1-101-001-00	CERAMIC 0.001MF	50V
R107	1-215-429-00	METAL 2.2K 1% 1/6W		C29	1-101-001-00	CERAMIC 0.001MF	50V
R108	1-215-429-00	METAL 2.2K 1% 1/6W		C30	1-101-001-00	CERAMIC 0.001MF	50V
R110	1-215-397-00	METAL 100 1% 1/6W		C31	1-101-001-00	CERAMIC 0.001MF	50V
R201	1-215-421-00	METAL 1K 1% 1/6W		C34	1-101-001-00	CERAMIC 0.001MF	50V
R202	1-215-421-00	METAL 1K 1% 1/6W		C35	1-101-001-00	CERAMIC 0.001MF	50V
R203	1-215-421-00	METAL 1K 1% 1/6W		C50	1-101-004-00	CERAMIC 0.01MF	50V
R204	1-215-421-00	METAL 1K 1% 1/6W		C51	1-101-004-00	CERAMIC 0.01MF	50V
R205	1-215-421-00	METAL 1K 1% 1/6W		C52	1-101-004-00	CERAMIC 0.01MF	50V
R206	1-215-421-00	METAL 1K 1% 1/6W		C53	1-101-004-00	CERAMIC 0.01MF	50V
R207	1-215-429-00	METAL 2.2K 1% 1/6W		C54	1-101-004-00	CERAMIC 0.01MF	50V
R208	1-215-429-00	METAL 2.2K 1% 1/6W		C55	1-101-004-00	CERAMIC 0.01MF	50V
R210	1-215-397-00	METAL 100 1% 1/6W		C56	1-101-004-00	CERAMIC 0.01MF	50V
R301	1-215-421-00	METAL 1K 1% 1/6W		C57	1-101-004-00	CERAMIC 0.01MF	50V
R302	1-215-421-00	METAL 1K 1% 1/6W		C58	1-101-004-00	CERAMIC 0.01MF	50V
R303	1-215-421-00	METAL 1K 1% 1/6W		C59	1-101-004-00	CERAMIC 0.01MF	50V
R304	1-215-421-00	METAL 1K 1% 1/6W		C60	1-101-004-00	CERAMIC 0.01MF	50V
R305	1-215-421-00	METAL 1K 1% 1/6W		C61	1-101-004-00	CERAMIC 0.01MF	50V
R306	1-215-421-00	METAL 1K 1% 1/6W		C62	1-101-004-00	CERAMIC 0.01MF	50V
R307	1-215-429-00	METAL 2.2K 1% 1/6W		C63	1-101-004-00	CERAMIC 0.01MF	50V
R308	1-215-429-00	METAL 2.2K 1% 1/6W		C64	1-101-004-00	CERAMIC 0.01MF	50V
R310	1-215-397-00	METAL 100 1% 1/6W		C65	1-101-004-00	CERAMIC 0.01MF	50V
				C66	1-101-004-00	CERAMIC 0.01MF	50V
VARIABLE RESISTOR				C67	1-101-004-00	CERAMIC 0.01MF	50V
RV1	1-237-515-21	RES, ADJ, CERMET 1K		C68	1-101-004-00	CERAMIC 0.01MF	50V
RV2	1-237-515-21	RES, ADJ, CERMET 1K		C69	1-101-004-00	CERAMIC 0.01MF	50V
SWITCH				C70	1-101-004-00	CERAMIC 0.01MF	50V
SW1	1-554-027-00	SWITCH, ROTARY		C71	1-101-004-00	CERAMIC 0.01MF	50V
*****				C72	1-101-004-00	CERAMIC 0.01MF	50V
*A-1394-142-A	ZA BOARD, COMPLETE			C78	1-101-004-00	CERAMIC 0.01MF	50V
	*****			C79	1-101-004-00	CERAMIC 0.01MF	50V
*4-353-708-00	HOOK, FINGER			C80	1-101-004-00	CERAMIC 0.01MF	50V
4-378-915-01	NUT (M2.6), PLATE			C81	1-101-004-00	CERAMIC 0.01MF	50V
				C82	1-101-004-00	CERAMIC 0.01MF	50V
				C83	1-101-004-00	CERAMIC 0.01MF	50V
				C84	1-101-004-00	CERAMIC 0.01MF	50V
				C85	1-101-004-00	CERAMIC 0.01MF	50V
				C86	1-101-004-00	CERAMIC 0.01MF	50V

ZA

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
<u>IC</u>				R4	1-247-848-11	CARBON	5.1K 5% 1/4W
IC1	8-759-903-93	IC SN74LS393N		R5	1-215-432-00	METAL	3K 1% 1/6W
IC2	8-759-900-00	IC SN74LS00N		R6	1-215-432-00	METAL	3K 1% 1/6W
IC3	8-759-900-00	IC SN74LS00N		R7	1-215-432-00	METAL	3K 1% 1/6W
IC4	8-759-900-08	IC SN74LS08N		R8	1-215-432-00	METAL	3K 1% 1/6W
IC5	8-759-900-00	IC SN74LS00N		R9	1-215-432-00	METAL	3K 1% 1/6W
IC6	8-759-900-14	IC SN74LS14N		R10	1-215-432-00	METAL	3K 1% 1/6W
IC7	8-759-903-93	IC SN74LS393N		R11	1-215-432-00	METAL	3K 1% 1/6W
IC8	8-759-773-14	IC TBP28S42N-CURSB		R12	1-215-432-00	METAL	3K 1% 1/6W
IC9	*1-526-656-00	SOCKET, IC (DP) 20P; IC8		R13	1-215-432-00	METAL	3K 1% 1/6W
	8-759-902-73	IC SN74LS273N		R14	1-215-432-00	METAL	3K 1% 1/6W
IC10	8-759-901-51	IC SN74LS151N		R15	1-215-432-00	METAL	3K 1% 1/6W
IC11	8-759-900-00	IC SN74LS00N		R16	1-215-432-00	METAL	3K 1% 1/6W
IC12	8-759-900-86	IC SN74LS86N		R19	1-215-432-00	METAL	3K 1% 1/6W
IC13	8-759-903-93	IC SN74LS393N		R20	1-215-432-00	METAL	3K 1% 1/6W
IC14	8-759-768-51	IC MB7053-DLYC		R21	1-249-405-11	CARBON	100 5% 1/4W
	*1-526-654-00	SOCKET, IC (DP) 16P; IC14		R22	1-215-447-00	METAL	12K 1% 1/6W
IC15	8-759-900-74	IC SN74LS74AN		R23	1-215-447-00	METAL	12K 1% 1/6W
IC16	8-759-903-93	IC SN74LS393N		R24	1-249-405-11	CARBON	100 5% 1/4W
IC17	8-759-773-14	IC TBP28S42N-CURSB		R25	1-215-447-00	METAL	12K 1% 1/6W
	*1-526-656-00	SOCKET, IC (DP) 20P; IC17		R26	1-215-447-00	METAL	12K 1% 1/6W
IC18	8-759-902-73	IC SN74LS273N		R27	1-249-405-11	CARBON	100 5% 1/4W
IC19	8-759-901-51	IC SN74LS151N		R28	1-215-447-00	METAL	12K 1% 1/6W
IC20	8-759-901-38	IC SN74LS138N		R29	1-215-447-00	METAL	12K 1% 1/6W
IC21	8-759-901-38	IC SN74LS138N		R30	1-249-405-11	CARBON	100 5% 1/4W
IC22	8-759-901-39	IC SN74LS139N		R31	1-215-447-00	METAL	12K 1% 1/6W
IC23	8-759-902-44	IC SN74LS244N		R32	1-215-447-00	METAL	12K 1% 1/6W
IC24	8-759-902-73	IC SN74LS273N		R33	1-249-405-11	CARBON	100 5% 1/4W
IC25	8-759-902-73	IC SN74LS273N		R34	1-215-447-00	METAL	12K 1% 1/6W
IC26	8-759-902-73	IC SN74LS273N		R35	1-215-447-00	METAL	12K 1% 1/6W
IC27	8-759-902-73	IC SN74LS273N		R36	1-249-405-11	CARBON	100 5% 1/4W
IC28	8-759-901-38	IC SN74LS138N		R37	1-215-447-00	METAL	12K 1% 1/6W
IC29	8-749-900-14	IC CP2005S		R38	1-215-447-00	METAL	12K 1% 1/6W
IC30	8-749-900-14	IC CP2005S		R39	1-215-397-00	METAL	100 1% 1/6W
IC31	8-749-900-14	IC CP2005S		R40	1-215-447-00	METAL	12K 1% 1/6W
IC32	8-749-900-14	IC CP2005S		R41	1-215-447-00	METAL	12K 1% 1/6W
IC33	8-749-900-14	IC CP2005S		R42	1-215-455-00	METAL	27K 5% 1/6W
IC34	8-749-900-14	IC CP2005S		R43	1-215-447-00	METAL	12K 1% 1/6W
IC36	8-749-900-14	IC CP2005S		R44	1-215-447-00	METAL	12K 1% 1/6W
IC37	8-759-145-57	IC UPC4557C		R45	1-215-397-00	METAL	100 1% 1/6W
IC38	8-759-145-57	IC UPC4557C		R46	1-215-447-00	METAL	12K 1% 1/6W
IC39	8-759-145-57	IC UPC4557C		R47	1-215-447-00	METAL	12K 1% 1/6W
IC40	8-759-145-57	IC UPC4557C		R48	1-215-455-00	METAL	27K 5% 1/6W
IC41	8-759-145-57	IC UPC4557C		R49	1-215-447-00	METAL	12K 1% 1/6W
IC42	8-759-145-57	IC UPC4557C		R50	1-215-447-00	METAL	12K 1% 1/6W
IC44	8-759-145-57	IC UPC4557C		R51	1-215-397-00	METAL	100 1% 1/6W
IC45	8-759-107-33	IC UPC1060C		R52	1-215-447-00	METAL	12K 1% 1/6W
IC46	8-759-107-33	IC UPC1060C		R53	1-215-447-00	METAL	12K 1% 1/6W
				R54	1-215-455-00	METAL	27K 5% 1/6W
				R55	1-215-447-00	METAL	12K 1% 1/6W
<u>COIL</u>				R56	1-215-447-00	METAL	12K 1% 1/6W
L1	1-409-309-00	COIL, SN 72UH		R63	1-249-405-11	CARBON	100 5% 1/4W
				R64	1-215-447-00	METAL	12K 1% 1/6W
				R65	1-215-447-00	METAL	12K 1% 1/6W
				R67	1-215-447-00	METAL	12K 1% 1/6W
				R68	1-215-447-00	METAL	12K 1% 1/6W
<u>TRANSISTOR</u>				<u>RESISTOR BLOCK</u>			
Q3	8-729-900-36	TRANSISTOR DTC124ES		RB1	1-231-408-00	RESISTOR BLOCK 5.1K	
Q4	8-729-900-36	TRANSISTOR DTC124ES		RB2	1-231-408-00	RESISTOR BLOCK 5.1K	
<u>RESISTOR</u>							
R1	1-249-405-11	CARBON	100 5% 1/4W				
R2	1-249-406-11	CARBON	120 5% 1/4W				
R3	1-247-848-11	CARBON	5.1K 5% 1/4W				

ZA

ZC

Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
<u>CONNECTOR</u>							
ZA1	*1-562-729-11	CONNECTOR, MULTI 64P		IC10	8-759-910-04	IC SN74S04N	
*****				IC11	8-759-903-93	IC SN74LS393N	
	*A-1394-143-A	ZC BOARD, COMPLETE		IC12	8-759-926-31	IC AM26LS31PC	
		*****			*1-526-654-00	SOCKET, IC (DP) 16P; IC12	
	*4-353-708-00	HOOK, FINGER		IC13	8-759-926-32	IC AM26LS32PC	
	4-378-915-01	NUT (M2.6), PLATE			*1-526-654-00	SOCKET, IC (DP) 16P; IC13	
<u>CAPACITOR</u>				IC14	8-759-916-84	IC LH0084A	
C1	1-123-661-00	ELECT 100MF 20% 6.3V			*1-526-662-21	SOCKET, IC (DP) 40P; IC14	
C2	1-123-661-00	ELECT 100MF 20% 6.3V		IC15	8-759-916-82	IC LH0082AD	
C4	1-124-589-11	ELECT 47MF 20% 16V			*1-526-659-00	SOCKET, IC (DP) 28P; IC15	
C5	1-124-589-11	ELECT 47MF 20% 16V		IC16	8-759-901-39	IC SN74LS139N	
C6	1-126-157-11	ELECT 10MF 20% 16V		IC17	8-759-901-38	IC SN74LS138N	
C7	1-102-973-00	CERAMIC 100PF 5% 50V		IC18	8-759-901-38	IC SN74LS138N	
C8	1-101-004-00	CERAMIC 0.01MF 50V		IC19	8-759-900-04	IC SN74LS04N	
C9	1-101-004-00	CERAMIC 0.01MF 50V		IC20	8-759-900-32	IC SN74LS32N	
C10	1-101-004-00	CERAMIC 0.01MF 50V		IC21	8-759-900-02	IC SN74LS02N	
C11	1-101-004-00	CERAMIC 0.01MF 50V		IC22	8-759-900-32	IC SN74LS32N	
C12	1-101-004-00	CERAMIC 0.01MF 50V		IC23	8-759-903-77	IC SN74LS377N	
C13	1-101-004-00	CERAMIC 0.01MF 50V		IC24	8-759-903-77	IC SN74LS377N	
C14	1-101-004-00	CERAMIC 0.01MF 50V		IC25	8-759-902-40	IC SN74LS240N	
C15	1-101-004-00	CERAMIC 0.01MF 50V		IC26	8-759-645-19	IC M54519P	
C16	1-101-004-00	CERAMIC 0.01MF 50V			*1-526-654-00	SOCKET, IC (DP) 16P; IC26	
C17	1-101-004-00	CERAMIC 0.01MF 50V		IC27	8-759-645-19	IC M54519P	
C18	1-101-004-00	CERAMIC 0.01MF 50V			*1-526-654-00	SOCKET, IC (DP) 16P; IC27	
C19	1-101-004-00	CERAMIC 0.01MF 50V		<u>COIL</u>			
C20	1-101-004-00	CERAMIC 0.01MF 50V		L1	1-409-309-00	COIL, SN 72UH	
C21	1-101-004-00	CERAMIC 0.01MF 50V		<u>TRANSISTOR</u>			
C22	1-101-004-00	CERAMIC 0.01MF 50V		Q1	8-729-173-38	TRANSISTOR 2SA733-K	
C23	1-102-961-00	CERAMIC 27PF 5% 50V		Q2	8-729-600-27	TRANSISTOR 2SC634SP	
C24	1-101-004-00	CERAMIC 0.01MF 50V		Q3	8-729-173-38	TRANSISTOR 2SA733-K	
C25	1-101-004-00	CERAMIC 0.01MF 50V		<u>RESISTOR</u>			
C26	1-101-004-00	CERAMIC 0.01MF 50V		R1	1-249-437-11	CARBON 47K 5% 1/4W	
C27	1-101-004-00	CERAMIC 0.01MF 50V		R2	1-249-437-11	CARBON 47K 5% 1/4W	
<u>DIODE</u>				R3	1-249-413-11	CARBON 470 5% 1/4W	
D1	8-719-911-19	DIODE 1SS119		R4	1-249-411-11	CARBON 330 5% 1/4W	
D2	8-719-911-19	DIODE 1SS119		R5	1-249-411-11	CARBON 330 5% 1/4W	
D3	8-719-911-19	DIODE 1SS119		R6	1-249-405-11	CARBON 100 5% 1/4W	
D4	8-719-800-60	DIODE TLR214		R7	1-249-411-11	CARBON 330 5% 1/4W	
D5	8-719-800-60	DIODE TLR214		R8	1-249-429-11	CARBON 10K 5% 1/4W	
D6	8-719-800-60	DIODE TLR214		R9	1-249-429-11	CARBON 10K 5% 1/4W	
<u>IC</u>				R10	1-249-429-11	CARBON 10K 5% 1/4W	
IC1	8-759-900-14	IC SN74LS14N		R11	1-249-429-11	CARBON 10K 5% 1/4W	
IC2	8-759-900-32	IC SN74LS32N		R12	1-249-409-11	CARBON 220 5% 1/4W	
IC3	8-759-916-80	IC LH0080A		R13	1-249-420-11	CARBON 1.8K 5% 1/4W	
	*1-526-662-21	SOCKET, IC (DP) 40P; IC3		R14	1-249-405-11	CARBON 100 5% 1/4W	
IC4	8-759-777-17	IC 2764-HDMH2		R15	1-249-442-11	CARBON 510 5% 1/4W	
	*1-526-659-00	SOCKET, IC (DP) 28P; IC4		R16	1-249-417-11	CARBON 1K 5% 1/4W	
IC5	8-752-321-00	IC CKK5816PN-12L		R17	1-247-814-11	CARBON 200 5% 1/4W	
	*1-526-658-21	SOCKET, IC (DP) 24P; IC5		R18	1-249-397-11	CARBON 22 5% 1/4W	
IC6	8-759-937-93	IC D2817A		R19	1-249-397-11	CARBON 22 5% 1/4W	
	*1-526-659-00	SOCKET, IC (DP) 28P; IC6		R20	1-249-405-11	CARBON 100 5% 1/4W	
IC7	8-759-902-44	IC SN74LS244N		R21	1-249-437-11	CARBON 47K 5% 1/4W	
IC8	8-759-902-44	IC SN74LS244N		R22	1-249-405-11	CARBON 100 5% 1/4W	
IC9	8-759-906-45	IC SN74LS645N		R23	1-249-401-11	CARBON 47 5% 1/4W	
				R24	1-249-401-11	CARBON 47 5% 1/4W	
				R25	1-249-425-11	CARBON 4.7K 5% 1/4W	
				R26	1-249-401-11	CARBON 47 5% 1/4W	
				R27	1-249-437-11	CARBON 47K 5% 1/4W	
				R28	1-249-401-11	CARBON 47 5% 1/4W	




Ref.No.	Part No.	Description	Remark	Ref.No.	Part No.	Description	Remark
R29	1-249-401-11	CARBON 47 5% 1/4W		C41	1-102-074-00	CERAMIC 0.001MF 10% 50V	
R30	1-249-401-11	CARBON 47 5% 1/4W		C50	1-126-234-11	ELECT 2200MF 20% 16V	
R31	1-249-405-11	CARBON 100 5% 1/4W		C51	1-124-360-00	ELECT 1000MF 20% 16V	
R32	1-249-405-11	CARBON 100 5% 1/4W		C52	1-102-074-00	CERAMIC 0.001MF 10% 50V	
R33	1-249-405-11	CARBON 100 5% 1/4W		C60	1-126-234-11	ELECT 2200MF 20% 16V	
R34	1-249-393-11	CARBON 10 5% 1/4W		C61	1-124-360-00	ELECT 1000MF 20% 16V	
R35	1-249-405-11	CARBON 100 5% 1/4W		C62	1-102-074-00	CERAMIC 0.001MF 10% 50V	
R36	1-249-405-11	CARBON 100 5% 1/4W		C70	1-136-165-00	FILM 0.1MF 5% 50V	
R37	1-249-417-11	CARBON 1K 5% 1/4W		C71	1-102-074-00	CERAMIC 0.001MF 10% 50V	
R38	1-249-417-11	CARBON 1K 5% 1/4W		C72	1-102-074-00	CERAMIC 0.001MF 10% 50V	
R39	1-249-417-11	CARBON 1K 5% 1/4W		C80	1-123-332-00	ELECT 47MF 20% 16V	
RESISTOR BLOCK				C81	1-123-332-00	ELECT 47MF 20% 16V	
RB1	1-231-410-00	RESISTOR BLOCK 10K		C82	1-123-332-00	ELECT 47MF 20% 16V	
RB2	1-231-410-00	RESISTOR BLOCK 10K		C83	1-123-332-00	ELECT 47MF 20% 16V	
RB3	1-231-410-00	RESISTOR BLOCK 10K		C84	1-123-332-00	ELECT 47MF 20% 16V	
RB4	1-231-410-00	RESISTOR BLOCK 10K		C85	1-123-332-00	ELECT 47MF 20% 16V	
SWITCH				C100	1-102-074-00	CERAMIC 0.001MF 10% 50V	
SW1	1-553-997-00	SWITCH, KEY BOARD		C101	1-102-074-00	CERAMIC 0.001MF 10% 50V	
SW2	1-553-997-00	SWITCH, KEY BOARD		C102	1-136-165-00	FILM 0.1MF 5% 50V	
CRYSTAL				C200	1-102-074-00	CERAMIC 0.001MF 10% 50V	
X1	1-527-827-00	OSCILLATOR, CRYSTAL		C201	1-102-074-00	CERAMIC 0.001MF 10% 50V	
CONNECTOR				C202	1-136-165-00	FILM 0.1MF 5% 50V	
ZC1	*1-562-729-11	CONNECTOR, MULTI 64P		C300	1-102-074-00	CERAMIC 0.001MF 10% 50V	
ZC2	*1-561-724-00	SOCKET, CONNECTOR 2P		C301	1-102-074-00	CERAMIC 0.001MF 10% 50V	
ZC2	*1-564-431-11	POST, CONNECTOR 3P		C302	1-136-165-00	FILM 0.1MF 5% 50V	
*****				C400	1-102-074-00	CERAMIC 0.001MF 10% 50V	
*A-1394-157-A R BOARD, COMPLETE				C401	1-102-074-00	CERAMIC 0.001MF 10% 50V	
*****				C402	1-136-165-00	FILM 0.1MF 5% 50V	
CAPACITOR				C500	1-102-074-00	CERAMIC 0.001MF 10% 50V	
C1	1-101-004-00	CERAMIC 0.01MF 50V		C501	1-102-074-00	CERAMIC 0.001MF 10% 50V	
C2	1-101-004-00	CERAMIC 0.01MF 50V		C502	1-136-165-00	FILM 0.1MF 5% 50V	
C3	1-101-004-00	CERAMIC 0.01MF 50V		C600	1-102-074-00	CERAMIC 0.001MF 10% 50V	
C4	1-102-074-00	CERAMIC 0.001MF 10% 50V		C601	1-102-074-00	CERAMIC 0.001MF 10% 50V	
C5	1-102-074-00	CERAMIC 0.001MF 10% 50V		C602	1-136-165-00	FILM 0.1MF 5% 50V	
C6	1-101-004-00	CERAMIC 0.01MF 50V		C701	1-101-004-00	CERAMIC 0.01MF 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V		C702	1-101-004-00	CERAMIC 0.01MF 50V	
C8	1-102-074-00	CERAMIC 0.001MF 10% 50V		C703	1-101-004-00	CERAMIC 0.01MF 50V	
C9	1-102-074-00	CERAMIC 0.001MF 10% 50V		C704	1-101-004-00	CERAMIC 0.01MF 50V	
C10	1-102-074-00	CERAMIC 0.001MF 10% 50V		C705	1-101-004-00	CERAMIC 0.01MF 50V	
C11	1-102-074-00	CERAMIC 0.001MF 10% 50V		C706	1-101-004-00	CERAMIC 0.01MF 50V	
C12	1-102-074-00	CERAMIC 0.001MF 10% 50V		C707	1-101-004-00	CERAMIC 0.01MF 50V	
C13	1-102-074-00	CERAMIC 0.001MF 10% 50V		C708	1-101-004-00	CERAMIC 0.01MF 50V	
C14	1-123-356-00	ELECT 10MF 20% 16V		C709	1-101-004-00	CERAMIC 0.01MF 50V	
C15	1-123-356-00	ELECT 10MF 20% 16V		C710	1-101-004-00	CERAMIC 0.01MF 50V	
C16	1-123-356-00	ELECT 10MF 20% 16V		C711	1-101-004-00	CERAMIC 0.01MF 50V	
C17	1-123-356-00	ELECT 10MF 20% 16V		C712	1-101-004-00	CERAMIC 0.01MF 50V	
C18	1-126-101-11	ELECT 100MF 20% 10V		C713	1-101-004-00	CERAMIC 0.01MF 50V	
C19	1-123-332-00	ELECT 47MF 20% 16V		C714	1-101-004-00	CERAMIC 0.01MF 50V	
C20	1-123-332-00	ELECT 47MF 20% 16V		C715	1-101-004-00	CERAMIC 0.01MF 50V	
C21	1-123-356-00	ELECT 10MF 20% 16V		C716	1-101-004-00	CERAMIC 0.01MF 50V	
C22	1-123-356-00	ELECT 10MF 20% 16V		DIODE			
C24	1-136-165-00	FILM 0.1MF 5% 50V		D1	8-719-971-20	DIODE ERC38-06	
C25	1-136-165-00	FILM 0.1MF 5% 50V		D2	8-719-971-20	DIODE ERC38-06	
C40	1-123-332-00	ELECT 47MF 20% 16V		D3	8-719-911-19	DIODE 1SS119	
IC				D4	8-719-911-19	DIODE 1SS119	
IC1	8-759-202-74	IC TC74HC04P		D5	8-719-110-03	DIODE RD7.5ES-B2	
				D6	8-719-110-03	DIODE RD7.5ES-B2	
				D7	8-719-911-19	DIODE 1SS119	
				D8	8-719-110-18	DIODE RD10ES-B3	

7. ELECTRICAL PARTS LIST

7-54

7. ELECTRICAL PARTS LIST

The components identified by shading and mark  are critical for safety.
Replace only with part number specified.

7-56

The components identified by shading and mark Δ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque Δ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Ref.No.	Part No.	Description	Remark
	Δ 1-453-107-21	HIGH-VOLTAGE BLOCK (DCT BLOCK)	
	1-533-148-00	HOLDER, FUSE	
	*1-556-973-21	CONNECTOR ASSY, MICRO (2.5MM) 2P (HDM-3830 ONLY)	
	*1-557-152-91	CABLE, PIN	
	*1-559-134-11	CONNECTOR ASSY	
	*1-942-230-11	HARNESS (A)	
	*1-942-231-11	HARNESS (B)	
CNP901	Δ 1-509-546-11	3P INLET	
F901	Δ 1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-3830E ONLY)	
	Δ 1-532-748-11	FUSE, GLASS TUBE 6.3A/125V (HDM-3830 ONLY)	
IC101	8-759-971-94	IC MBM27C256A-25	
IC102	8-759-971-94	IC MBM27C256A-25	
IC103	8-759-971-94	IC MBM27C256A-25	
L901	Δ 1-426-381-11	COIL, DEMAGNETIZATION	
L902	Δ 1-451-326-11	DEFLECTION YOKE (SY-181)	
L903	Δ 1-452-262-41	PICTURE TUBE NECK ASSY (361)	
L904	Δ 1-452-261-22	PICTURE TUBE NECK ASSY (362)	
S901	Δ 1-570-052-12	SWITCH, PUSH (AC POWER)(1 KEY)	
S902	Δ 1-570-173-21	SWITCH, VOLTAGE CHANGE	
T901	Δ 1-439-381-11	TRANSFORMER ASSY, FLYBACK	
V901	Δ 8-734-221-75	PICTURE TUBE SD-181 (41 HDF)	

ACCESSORIES AND PACKING MATERIALS

Part No.	Description	Remark
A-1043-400-A	PACKING GP(CARRING HANDLE), SUB	
A-1043-401-A	PACKING GROUP (HOOD)	
*X-4378-930-1	PALLET ASSY	
Δ 1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-3830E ONLY)	
Δ 1-532-748-11	FUSE, GLASS TUBE 6.3A/125V (HDM-3830 ONLY)	
Δ 1-551-812-11	CORD, POWER (HDM-3830 ONLY)	
Δ 1-534-819-14	POWER CORD (HDM-3830E ONLY)	
1-564-662-11	PLUG, BNC (75 OHM)	
*4-356-207-00	BAND, ASSY	
*4-386-739-01	BAG, PROTECTION	
*4-390-455-01	SHEET, POLYETHYLENE	
*4-390-463-01	CUSHION (LOWER)	
*4-390-467-01	LID	
*4-390-470-01	PANEL (A) (HDM-3830E ONLY)	
*4-390-471-01	PANEL (B) (HDM-3830E ONLY)	
*4-390-479-01	PANEL (A) (HDM-3830 ONLY)	
*4-390-480-01	PANEL (B) (HDM-3830 ONLY)	
4-390-481-01	MANUAL, OPERATION & MAINTENANCE	
*4-611-740-21	JOINT	
7-700-731-03	DRIVER, VR ADJUSTMENT	

4-390-487-01

Sony Corporation
TV Group

English
881E09011-1
Printed in Japan
© 1988.9